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PHASE 1 REMOVAL ACTION WORKPLAN

RIVERDALE CHEMICAL COMPANY

Prepared For
Riverdale Chemical Company
Chicago Heights, Illinois

Prepared By
RMT, Inc.
Chicago, Illinois

September 2000

A Partnership Including Professional Corporations
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McDERMOTT, WILL & EMERY

September 15, 2000

VIA MESSENGER

Mr. Matthew Ohl
USEPA, Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604

Re: Riverdale Revised Work Plan

Dear Matt:

Enclosed is the revised Work Plan for Riverdale. Please call me or Rae Mindock if you have any questions.

Sincerely yours,

Todd R. Wiener

TRW:ji
Enclosure

cc: Karen Peaceman, Esq. (w/enc., via messenger)
Ms. Callie Bolattino, Emergency Response Branch (w/enc., via messenger)
Mr. Peter Bibby (w/o enc., via facsimile)

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List of Acronyms

ARARs	Applicable or Relevant and Appropriate Requirements
ASTM	American Society for Testing and Materials
bgs	below ground surface
BLRA	Baseline Risk Assessment
CCB	continuing calibration blank
CCC	calibration check compound
CCV	continuing calibration verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
COC	Chain of Custody
COPC	Compounds of Potential Concern
CRDL	Contract Required Detection Limits
CRL	Central Regional Laboratory
CRQL	Contract Required Quantitation Limits
DCF	document control format
DQO	Data Quality Objective
FCR	field change request
FSAP	Field Sampling and Analysis Plan
GC/MS	gas chromatograph/mass spectrophotometer
HSC	Health and Safety Coordinator
HSP	Health and Safety Plan
HSR	Health and Safety Representative
IAC	Illinois Administrative Code
ICB	initial calibration blank
ICP	inductively coupled plasma
ICS	interface check samples
ID	internal diameter
IDW	Investigation-derived waste

IEPA	Illinois Environmental Protection Agency
LCS	laboratory control sample
MDL	Method Detection Limit
mg	milligrams
MS	matrix spike
MS/MSD	matrix spike/matrix spike duplicate
MSD	matrix spike duplicate
M.S.L.	mean sea level
NGVD	National Geodectic Vertical Datum
O&M	Operation and Maintenance
OSC	On-Scene Coordinator
OSHA	Occupational Safety and Health Administration
ppb	parts per billion
PPE	personal protective equipment
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAS	routine analytical services
RCRA	Resource Conservation and Recovery Act
RF	response factor
RI/FS	Remedial Investigation/Feasibility Study
RPD	relative percent difference
RPM	Remedial Project Manager
RSD	relative standard deviation
RT	retention times
SARA	Superfund Amendments and Reauthorization Act
SMC	Sample Management Coordinator
SOP	standard operating procedure
SOW	Statement Of Work
SPCC	system performance check compound
SRM	standard reference materials
STL	Severn Trent Laboratories, Inc. (formerly Quantera)
SW846	Test Methods for Evaluating Solid Waste 1986

TAL	Target Analyze List
TBD	to be determined
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TEMP	temperature
TIC	Tentatively Identified Compound
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

Section 1
Introduction

This Phase I Removal Action (Phase I RA) Workplan (the Workplan) was prepared on behalf of Riverdale Chemical Company (Riverdale), to serve as the basis for the overall management of the Phase I Removal Action to be implemented at the Riverdale Site.

The scope of the Phase I RA is described in the letter to the United States Environmental Protection Agency (USEPA), Region 5, Office of Regional Counsel from McDermott, Will & Emery, on behalf of Riverdale, dated June 6, 2000, and modified per the June 26, 2000, conference call and subsequent discussions. The Phase I RA addresses the removal action proposed to address contaminated soil at three major areas of construction at the Riverdale Site. These construction areas are: 1) installation of upgraded secondary containment around the liquid storage area (liquid storage area); 2) expansion of the raw materials warehouse (raw materials warehouse); and 3) installation of a spill containment basin and 20,000 gallon storage area at the railroad unloading area (railroad unloading area). The scope will also include additional soil sampling at the utility area north of Building No. 2, the low lying area in the southeastern portion of the site and at southwest side of Building No. 3 (Hartwell Building expansion).

The components of this Phase I RA Workplan include the following:

- Soil sampling within the footprints of the liquid storage area and raw materials warehouse
- Soil sampling in the area where utilities (utility area) are located at the northern end of the site
- Soil sampling in the low lying area located at the southeastern side of the site which the USEPA has described as wetlands
- Soil sampling at the southwest side of Building No. 3 for the Hartwell Building expansion (20 foot by 40 foot pre-engineered building)
- Excavation and off-site disposal of soils (with concentrations of compounds of potential concern (COPC) that exceed a total cancer risk above 1×10^{-4} and noncancer hazard index greater than one) under the liquid storage area, with vertical extent based on the construction requirement; and the horizontal extent defined by confirmatory sampling and the boundaries of the liquid storage area
- Excavation and off-site disposal of soils (with concentrations of COPCs that exceed a calculated total cancer risk of 1×10^{-4} and noncancer hazard index greater than one) under the raw materials warehouse, with the vertical extent limited to five feet below ground

surface (bgs); and the horizontal extent defined by confirmatory sampling and the boundaries of the raw materials warehouse

- Excavation and off-site disposal of soils (with concentrations of COPCs that exceed a calculated total cancer risk above 1×10^{-4} and noncancer hazard index greater than one) under the railroad unloading area, with vertical extent limited to eight feet below ground surface and horizontal extent defined by the boundaries of the spill containment area and the 20,000 gallon storage area
- Installation of a utility corridor or excavation and off-site disposal of soils (with concentrations of COPCs that exceed a calculated total cancer risk of 1×10^{-4} and noncancer hazard index greater than one) at the utility area, if any, with the vertical extent based on the depth of utilities and the horizontal extent defined by confirmatory sampling adjacent to the buried utilities
- Characterization of excavated soils to determine off-site disposal requirements
- Description of the overall management strategy for performing the excavation and disposal activities related to the three areas, analysis of samples, reporting of analytical results, and reporting conclusions for the USEPA review and approval
- Documentation of the qualifications, responsibility, and authority of all organizations involved with the implementation of the Phase I RA

This Workplan describes the methods to be used to complete each of the components of the Phase I RA. The Workplan document provides the objectives and the technical approach for completing all the tasks outlined above. Following the implementation of the Phase I RA, an asphalt - engineered barrier will be constructed at the site as the Phase II Removal Action.

The Workplan has been organized into the following six sections:

- Section 1 Introduction - provides the basis, approach, and organization of the Workplan
- Section 2 Project Background - summarizes the information presented in the previous studies conducted at the Site
- Section 3 Soil Sampling and Removal Activities - presents the scope of work and technical approach for completing the Phase I RA
- Section 4 Project Organization and Management - introduces the overall organizational structure, project management, and the technical background of key personnel involved in completing the Phase I RA
- Section 5 Project Reports
- Section 6 Project Schedule - presents the estimated schedule for completing Phase I RA project tasks
- Section 7 References - presents document references

The Quality Assurance Project Plan (QAPP), included as Appendix A, has been prepared following the USEPA's guidance on preparation of QAPPs (EPA QA/G-5). The QAPP establishes quality control procedures that ensure the precision and accuracy of all data gathered related to the Phase I RA.

The Field Sampling and Analysis Plan (FSAP), included as Appendix B to the Workplan, addresses the sampling required to complete the Phase I RA.

The Health and Safety Plan (HSP), prepared to be consistent with current OSHA regulations and protocols, has been designed to protect on-site personnel from potential hazards associated with the site activities. The HSP is included in the Workplan as Appendix C.

SECTION 2

Section 2
Project Background

The Riverdale Chemical Company in Chicago Heights, Illinois, is an active facility used for the formulation and packaging of various agricultural and turf chemicals. Riverdale has been conducting an RI/FS under an AOC at the site since 1985.

In April 1984, a site study was conducted by the FIT as part of the National Dioxin Test Strategy Program. This study indicated the presence of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and pesticides in the surface soil at the site. Given the results of the FIT study, Riverdale completed an Interim Remedial Measure (IRM) to control exposure to contaminants under an AOC between the USEPA and Riverdale dated September 28, 1984. The IRM required placement of a geotextile fabric over an area of approximately 19,600-square feet along with a barrier layer of 8 to 10 inches of crushed limestone, which is regularly inspected and maintained.

Riverdale entered into a separate AOC on February 27, 1985, to conduct the RI/FS at the site. Fieldwork was conducted by IT between October 1985 and November 1986. The Final RI Report was submitted to the USEPA in April 1988. Riverdale continues to maintain the crushed limestone barrier along with other requirements of the IRM AOC.

A fire occurred at the facility on July 2, 1992, when a lighting strike apparently triggered a fire at the warehouse (Building 4). The warehouse contained various fungicide, herbicide, and insecticide products, including the active ingredients: 2, 4, -D, Dicamba, 2, 4, -DP, MCPA, MCPP, and oxidizers. These products were stored in the brick construction warehouse on a concrete slab floor. It was estimated that the fire consumed 85 percent of the contents of the warehouse. After the fire was extinguished, the fire residue was contained within the shell of the warehouse, secured with plastic sheeting within a cyclone fence, and permitted for proper disposal. Water used to fight the fire was diverted, through emergency excavation procedures, to a low area north of the warehouse and to a drainage pond southeast of the warehouse. The water was sampled and contained 2, 4, -D up to 420 ppm; MCPA up to 70 ppm; 2, 4, DP up to 17 ppm; MCPP up to 14 ppm; fungicide up to 58 ppm; and dicamba up to 4.1 ppm. With the approval of the USEPA, the Illinois Environmental Protection Agency (IEPA), and the Thorn Creek Basin Sanitary District, the collected water was discharged to the sewer system for treatment.

In 1996, the Agency for Toxic Substances and Disease Registry (ATSDR) conducted a study of the surrounding residential areas at the request of the USEPA. On July 29, 1996, ATSDR issued a report summarizing soil-sampling activities performed on May 2, 1996. The conclusion of the

report stated that the concentrations of base neutral/acid extractables (BN/As) and organochlorine chemicals detected in the surface soil samples from residential properties adjacent to the site, do not pose a public health hazard. The report recommended no further activities as a result of the soil sampling.

The USEPA contacted Riverdale in December 1996 to discuss finalization of the RI Report. The USEPA provided minor comments to be included prior to approval. Riverdale incorporated the USEPA's comments; and, in addition, revised the RI Report to reflect current site conditions and current guidance. Based on the Public Health Evaluation (PHE), the complete human exposure pathways are the industrial worker exposure to surface soil and construction worker exposure to surface and subsurface soil.

In 1998, Riverdale conducted additional limited investigations to provide the USEPA with geological data to support the conclusions of the RI Report. This information was presented in letter reports to the USEPA on March 24, 1998, and April 13, 1998, and was not incorporated into the RI Report or FS Work Plan. The supplemental information developed included a geologic characterization of the subsurface soil in the southern portion of the site, which confirms low hydraulic conductivity (10^{-8} cm/s) of underlying soil based on a two foot core sample interval. Although at the time of the testing the horizontal extent of the low conductivity clay layer was not defined, recent soil boring and excavation activites at the site visually confirm the presence of the clay across the site.

Riverdale has completed a Feasibility Study (FS) Report, which was submitted to the USEPA for review and comment in February 2000. Instead of finalizing the FS Report, the USEPA has subsequently prepared an Engineering Evaluation/Cost Analysis (EE/CA) for the site.

The Riverdale facility is an active manufacturing operation with expansions and upgrades necessary to meet regulatory requirements and business needs. Riverdale is currently undergoing three major construction projects including, a raw material storage warehouse (at the current raw material storage pad), a liquid storage facility (at the above ground tank farm), and an upgrade of the railroad unloading area (at the railroad siding located between Buildings No. 2 and No. 3) mandated by the Department of Agriculture requirements.

This Phase I RA Workplan describes the sampling and removal action activities that will be performed in the vicinity of the construction projects. It also described the ancillary soil sampling to be conducted at the proposed utility corridor, the low lying area and the Hartwell Building expansion.

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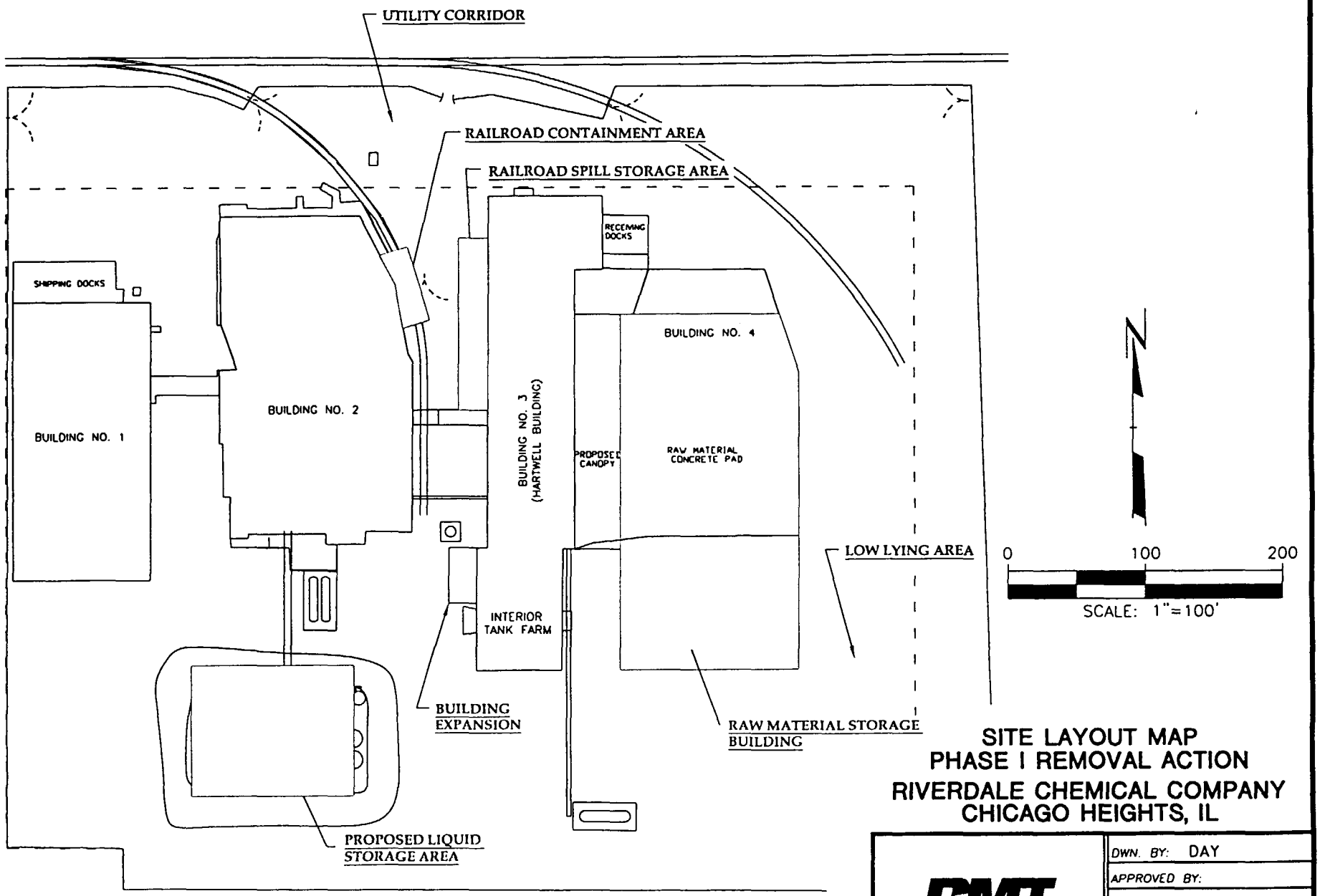


SITE LAYOUT MAP
PHASE I REMOVAL ACTION
RIVERDALE CHEMICAL COMPANY
CHICAGO HEIGHTS, IL

RMT

DWN. BY:	DAY
APPROVED BY:	
DATE:	SEPTEMBER 2000
PROJ. #	4962.01
FILE #	49620150

FIGURE 2-1

SECTION 3

Section 3
Soil Sampling and Removal Activities

3.1 Description of Phase I Removal Action

The proposed remedy for the site includes excavation and disposal of soil (Phase I RA) and installation of an enhanced asphalt cap (Phase II RA). Principal aspects and objectives for Phase I RA were determined based on discussions between Riverdale and the USEPA. The Phase I RA includes the collection of additional data necessary for the Phase I RA.

The soil sampling and removal action components of this Phase I RA Workplan include the following:

- Soil sampling within the footprints of the liquid storage area and raw materials warehouse
- Soil sampling in the area where utilities (utility area) are located at the northern end of the site
- Soil sampling in the low lying area located at the southeastern side of the site which the USEPA has described as wetlands
- Soil sampling at the southwest side of Building No. 3 for the Hartwell Building expansion (20 foot by 40 foot pre-engineered building)
- Excavation and off-site disposal of soils (with concentrations of compounds of potential concern (COPC) that exceed a total cancer risk above 1×10^{-4} and noncancer hazard index greater than one) under the liquid storage area, with vertical extent based on the construction requirement; and the horizontal extent defined by confirmatory sampling and the boundaries of the liquid storage area
- Excavation and off-site disposal of soils (with concentrations of COPCs that exceed a calculated total cancer risk of 1×10^{-4} and noncancer hazard index greater than one) under the raw materials warehouse, with the vertical extent limited to five feet bgs; and the horizontal extent defined by confirmatory sampling and the boundaries of the raw materials warehouse
- Excavation and off-site disposal of soils (with concentrations of COPCs that exceed a calculated total cancer risk above 1×10^{-4} and noncancer hazard index greater than one) under the railroad unloading area, with vertical extent limited to eight feet below ground surface and horizontal extent defined by the boundaries of the spill containment area and the 20,000 gallon storage area
- Installation of a utility corridor or excavation and off-site disposal of soils (with concentrations of COPCs that exceed a calculated total cancer risk of 1×10^{-4} and noncancer hazard index greater than one) at the utility area, if any, with the vertical extent based on

the depth of utilities and the horizontal extent defined by confirmatory sampling adjacent to the buried utilities

- Characterization of excavated soils to determine off-site disposal requirements

The soil sampling program, generally outlined above, is summarized in Table 3-1, Soil Sampling Program, which describes the sample locations and number of samples to be collected. Table 3-2, Analytical Parameters, provides the compounds to be analyzed, with proposed analytical requirements described in the subsequent sections. The analytical testing for disposal characterization is provided in Table 3-3, Analytical Parameters for Disposal Characterization. For purposes of this Workplan, there are three types of designated sampling activities: soil sampling, confirmation sampling, and disposal characterization.

The scope of the data collection activities and detailed testing methods and procedures are discussed in the QAPP and FSAP, included as appendices to this Phase I RA Workplan. Sampling and removal action activities will be conducted to be consistent with current OSHA regulations and protocols which have been designed to protect on-site personnel from potential hazards associated with the site activities as described in the HSP, also included as an appendix to this Workplan.

3.2 Soil Sampling

The purpose of the soil sampling is twofold: a) to confirm the extent, if any, of concentrations of COPCs that exceed a calculated total cancer risk above 1×10^{-4} and noncancer hazard index greater than one under the liquid storage area, the raw materials warehouse and in the vicinity of the utility area, and b) to confirm the presence, if any, of any such levels of contamination at the proposed utility corridor, in the low lying area at the southeastern side of the site and at the Hartwell Building expansion.

3.2.1 Scope

The scope of work for the soil sampling includes:

- Soil sampling within the footprints of the liquid storage area and raw materials warehouse
- Soil sampling in the area where utilities (utility area) are located at the northern end of the site
- Soil sampling in the low lying area located at the southeastern side of the site which the USEPA has described as a wetlands
- Soil sampling at the Hartwell Building expansion

Several sampling techniques will be used to collect the soil samples dependent on site conditions including: the thickness of the limestone layer, absence of limestone layer (low lying area) and current access considerations (existing tanks). Sampling at the liquid storage area, raw materials area, Hartwell Building expansion, and utility corridor will consist of soil samples borings drilled (or push probe sampling) to a depth of four-feet below ground surface (bgs). Two samples will be collected from each location, at approximately one foot to two-feet bgs, which is directly below the crushed limestone layer (the first interval with recovery) and at four-feet bgs.

An alternative sampling technique will be used at the raw materials warehouse excavation area, which is identified based on previous sampling results. The area is covered by approximately two feet of crushed limestone which has been compacted over several years. A backhoe will be used to remove the crushed limestone layer prior to sample collection. A sample will be collected directly below the crushed limestone layer using stainless steel sampling spoons. Following sample collection, the backhoe will be used to remove an additional two feet of soil to reach a depth of four feet bgs. The second soil sample will be obtained.

Samples collected in the low lying area will be collected at three locations using push probe sampling technique with samples collected from two depths, 0 to 12 inches bgs and from approximately 2.5 feet to 3.5 feet bgs (top of clay) to confirm consistent stratigraphy. Samples will be collected from 0 to 6 inches bgs at three other locations to determine potential extent of impact.

Sample locations for the liquid storage area, and raw materials storage area are provided in Figure 3-1 and Figure 3-2, respectively. The locations proposed for the utility area, low lying area and Hartwell Building expansion are provided in Figure 3-3, 3-4 and 3-5, respectively. The locations may be modified in the field based on accessibility to the areas.

3.2.2 Analytes and Sampling Frequency

Soil samples will be collected from the borings at the depths specified in the previous subsection to characterize the geology and to evaluate the extent of any contamination. The chemical analyses will include the COPCs listed in Table 3-2, with the exception of the analysis for dioxin, at all the locations. Results of the RI indicate that dioxin (2,3,7,8 TCDD) has not been detected in the railroad car unloading area or the utility area. Therefore, soil samples collected in at those two areas will be analyzed for the six pesticide COPCs.

Soil samples collected from the liquid storage area, raw materials warehouse, and the low lying area located to the southeastern side of the site will be analyzed for the six pesticide COPC's. Several samples will be analyzed for dioxin (2,3,7,8 TCDD) in these areas to confirm the extent, if any, of COPC's with concentrations of COPCs that exceed a calculated total cancer risk above 1×10^{-4} and noncancer hazard index greater than one. Three samples will be analyzed for dioxin (2,3,7,8 TCDD) in the liquid storage area; one at the east side (Phase 1 liquid storage area construction), one in the middle (Phase 1 liquid storage area construction), and one at the west side (Phase 2 liquid storage area construction). Similarly, two samples will be analyzed for dioxin (2,3,7,8 TCDD) at the east and west side of the raw materials warehouse. In the low lying area at the southeast side of the site, samples will be analyzed for full TCL (VOCs 8260, SVOCs 8270, PCBs 8082, Pesticides 8081, Herbicides 8151) and TAL (Metals 6010 and 7471) analysis. Two samples will be analyzed for full high resolution dioxin, SW8290 analysis.

Analytical methods are provided in the QAPP, included as Appendix A to the Workplan. Specific procedures for soil sampling are presented in the FSAP, included as Appendix B to the Workplan.

3.3 Confirmation Sampling

3.3.1 Scope

The scope of the confirmation sampling includes:

- Two to four soil samples will be collected from the base of the excavation at the liquid storage area. The locations of the samples will be based on vertical extent of the construction and soil sampling results.
- Four soil samples will be collected from the base of the excavation at the raw materials warehouse. The location of the sample will be based on the vertical extent limited to five feet bgs and horizontal extent based on soil sampling results.
- Five soil samples will be collected from base of the excavation at the railroad unloading area. Vertical extent will be limited to eight feet bgs and horizontal extent will be based on the construction requirements.
- One to five soil samples will be collected from base of the excavation, if any, at the utility area. The locations will be based on the depth of the utilities and the soil sampling results.

Discrete samples (grab) will be collected the base of the excavations. Sampling locations for the liquid storage area, raw material warehouse and railroad unloading area are shown on Figures 3-6 through 3-8, respectively. Sample locations at the utility area will be proposed, if necessary, based on the results of the horizontal sampling (Section 3.3.1).

3.3.2 Analytes and Sampling Frequency

Soil samples will be collected at the depths specified in the previous subsection to characterize the residual contamination, if any, at each of the excavations. Consistent with the rational described in Section 3.2.3, samples collected from the liquid storage area, the raw materials area, the railroad unloading area and the utility area will be analyzed for the six pesticide COPC's.

Analytical methods are provided in the QAPP, included as Appendix A to the Workplan. Specific procedures for soil sampling are presented in the FSAP, included as Appendix B to the Workplan.

3.4 Disposal Characterization

3.4.1 Scope

The scope of the disposal characterization includes:

- Characterization of soils excavated (with concentrations of COPCs that exceed a total cancer risk above 1 x 10^{-4} and noncancer hazard index greater than one) from the liquid storage area,
- Characterization of soils excavated (with concentrations of COPCs that exceed a calculated total cancer risk of 1 x 10^{-4} and noncancer hazard index greater than one) at the raw materials warehouse,
- Characterization of soil excavated (with concentrations of COPCs that exceed a calculated total cancer risk above 1 x 10^{-4} and noncancer hazard index greater than one) at the railroad unloading area
- Characterization of soil excavated during the installation of a utility corridor (with concentrations of COPCs that exceed a calculated total cancer risk of 1 x 10^{-4} and noncancer hazard index greater than one) at the utility area, if any

3.4.2 Analytes and Sampling Frequency

The excavated soil will be stockpiled in separate areas at the site. Soil will be stockpiled on visquin liner. The soils will also covered with visquin on a daily basis to manage the excavated soils prior to disposal. Composite samples from six to eight locations on the pile will be collected from the stockpiles following excavation activities. The composite sample will be representative of the excavated soil. The volume of soil to be excavated from this area is not defined at this point, therefore, the exact number of samples to be collected cannot be determined, but at a minimum, one composite sample will be taken from each area of excavation. The chemical analyses will include the characterization parameters listed in Table 3-3.

Analytical methods are provided in the QAPP, included as Appendix A to the Workplan. Specific procedures for sampling are presented in the FSAP, included as Appendix B to the Workplan.

3.5 Removal Action

3.5.1 Scope

The scope of the removal action includes:

- Excavation and off-site disposal of soils (with concentrations of COPCs that exceed a total cancer risk above 1×10^{-4} and noncancer hazard index greater than one) under the liquid storage area, if any, with vertical extent based on the construction requirement and horizontal extent defined by confirmatory sampling and the boundaries of the liquid storage area
- Excavation and off-site disposal of soils (with concentrations of COPCs that exceed a calculated total cancer risk of 1×10^{-4} and noncancer hazard index greater than one) under the raw materials warehouse, if any, with the vertical extent limited to five feet bgs and the horizontal extent defined by confirmatory sampling and the boundaries of the raw materials warehouse
- Excavation and off-site disposal of soils (with concentrations of COPCs that exceed a calculated total cancer risk above 1×10^{-4} and noncancer hazard index greater than one) under the railroad unloading area, with vertical extent limited to eight feet bgs and horizontal extent defined by the boundaries of the spill containment area and the 20,000 gallon storage area
- Installation of a utility corridor or excavation and off-site disposal of soils (with concentrations of COPCs that exceed a calculated total cancer risk of 1×10^{-4} and noncancer hazard index greater than one) at the utility area, if any, with the vertical extent based on the depth of utilities and the horizontal extent defined by confirmatory sampling adjacent to the buried utilities

If the concentrations of the COPCs exceed a calculated total cancer risk above 1×10^{-4} and noncancer hazard index greater than one at the base of the excavation, markers will be installed to document the residual contamination.

Table 3-1
Soil Sampling Program

SAMPLE LOCATION	PROPOSED NUMBER OF SAMPLES	DESCRIPTION
Horizontal Sampling		
Raw Materials Warehouse	Nineteen locations	Collected at 2 ft bgs and 4 ft bgs
Liquid Storage Area	Seventeen locations	Collected at 2 ft bgs and 4 ft bgs
Utility Area	Six locations	Collected at 2 ft bgs and 4 ft bgs
Low Lying Area	Six locations	Collected at 0.5 ft bgs and 3 ft bgs
Hartwell Building Expansion	Two locations	Collected at 2 ft bgs and 4 ft bgs
Confirmatory Sampling		
Raw Materials Warehouse	Four samples	Collected at base of excavation
Liquid Storage Area	Four samples	Collected at base of excavation
Railroad Unloading Area	Five samples	Collected at base of excavation
Utility Area	One to five samples (based on results of horizontal sampling)	Collected at base of excavation
Disposal Characterization		
Raw Materials Warehouse	Two	Collect from soil stockpile
Liquid Storage Area	One	Collect from soil stockpile
Railroad Unloading Area	Two	Collect from soil stockpile

Table 3-2
Analytical Parameters for COPCs

COMPOUND[1, 2]	QUANTITATION LIMITS
Soil	
Compound (CAS Number)	**µg/Kg**
2,3,7,8-TCDD[3]	0.1 - 1
Aldrin (309-00-2)	1.7
Chlordane, technical (57-74-9)	1.7
Dieldrin (60-57-1)	3.3
Heptachlor (76-44-8)	1.7
Heptachlor epoxide (1024-57-3)	1.7
Toxaphene (8001-35-2)	170

Notes:

(1) Dioxin compounds in soil are to be analyzed using the procedures in the QAPP.

(2) Pesticide compounds in soil are to be analyzed using the procedures in the QAPP.

(3) The samples for which dioxin analysis is included is described in Section 3.

Table 3-3
Analytical Parameters for Disposal Characterization

TCLPConstituent	Target Quantitation Limit (mg/L)[1]	TCLP Regulatory Level (mg/L)
Metals		
Arsenic	0.01	5.0
Barium	10	100
Cadmium	0.002	1.0
Chromium	0.005	5.0
Lead	0.003	5.0
Mercury	0.002	0.2
Selenium	0.005	1.0
Silver	0.008	5.0
Pesticides		
Chlordane (technical)	0.005	0.03
Endrin	0.0005	0.02
Heptachlor	0.0005	0.008
Lindane	0.0005	0.4
Methoxychlor	0.001	10.0
Toxaphene	0.02	0.5
Semivolatiles (a)		
O-Cresol	0.05	200
m-Cresol	0.1	200
p-Cresol	0.1	200
Cresol*	0.1	200
2,4,5-Trichlorophenol	0.05	400
2,4,6-Trichlorophenol	0.05	2
Pentachlorophenol	0.1	100

TCLPConstituent	Target Quantitation Limit (mg/L)	TCLP Regulatory Level (mg/L)
Herbicides		
2,4,5-TP Silvex	0.1	1.0
2,4-D	0.5	10.0
Semivolatiles (b/n)		
1,4-Dichlorobenzene	0.05	7.5
2,4-Dinitrotoluene	0.05	0.13
Hexachlorobenzene	0.05	0.13
Hexachlorobutadiene	0.05	0.5
Hexachloroethane	0.05	3.0
Nitrobenzene	0.05	2.0
Pyridine	0.1	5.0
Volatiles		
Benzene	0.025	0.5
Carbon tetrachloride	0.025	0.5
Chlorobenzene	0.025	100.0
Chloroform	0.025	6.0
1,2-Dichloroethane	0.025	0.5
1,1-Dichloroethylene	0.07	0.7
Methyl ethyl ketone	20	200.0
Tetrachloroethylene	0.07	0.7
Trichloroethylene	0.05	0.5
Vinyl chloride	0.05	0.2

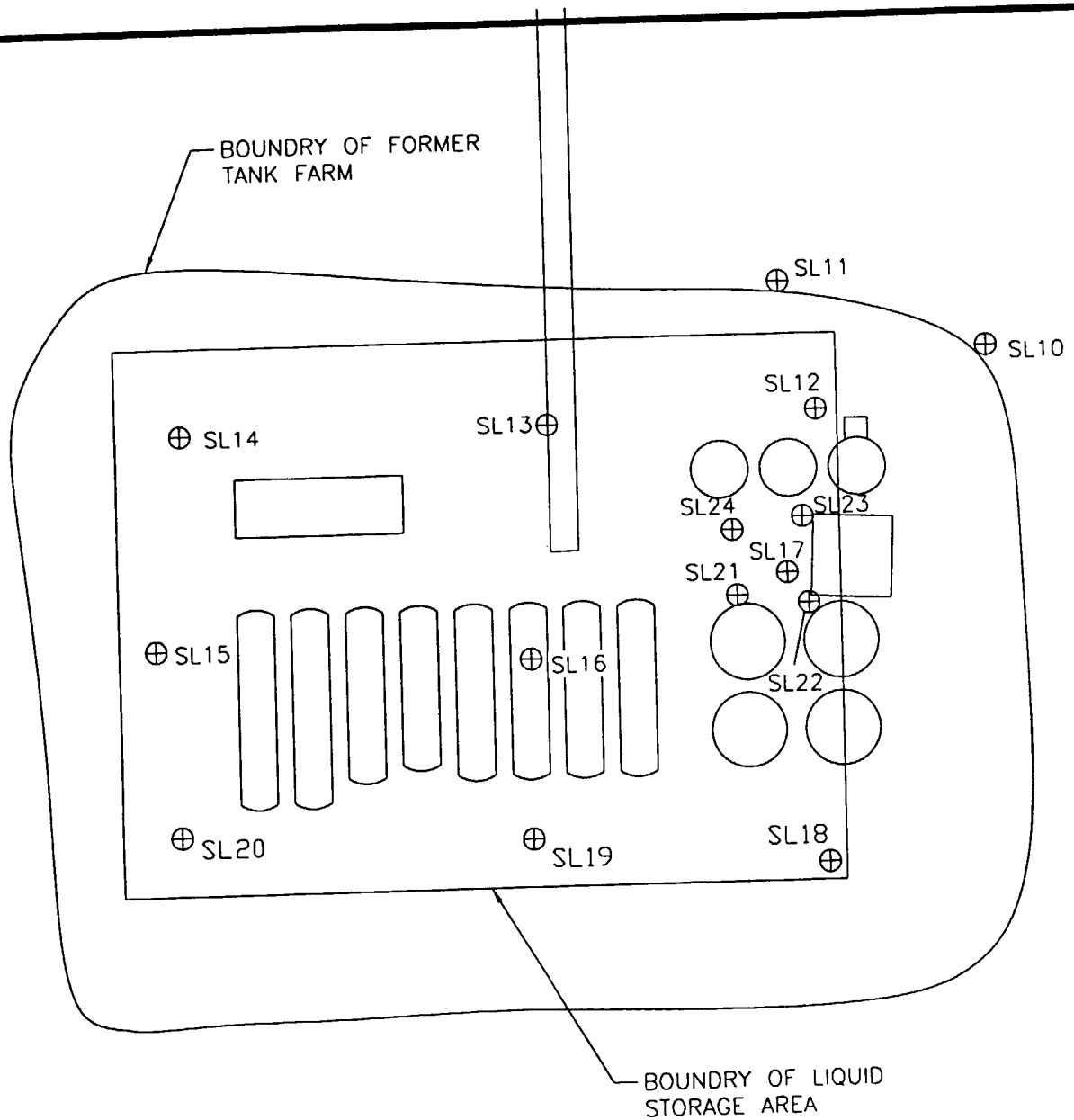
1) The target quantitation limits have been requested from the laboratory

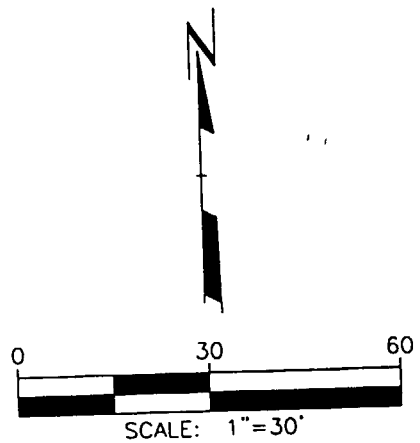
* If o-, m-, and p-cresol cannot be differentiated, the total cresol concentration is used.

(a) = acid extractable semivolatiles.

(b/n) = base neutral extractable semivolatiles.

RMT COMPUTER AIDED DESIGN & DRAFTING





LEGEND:

⊕ SOIL SAMPLING LOCATION

NOTE:

BOUNDRY LINES ARE APPROXIMATE

LIQUID STORAGE AREA SAMPLING LOCATIONS

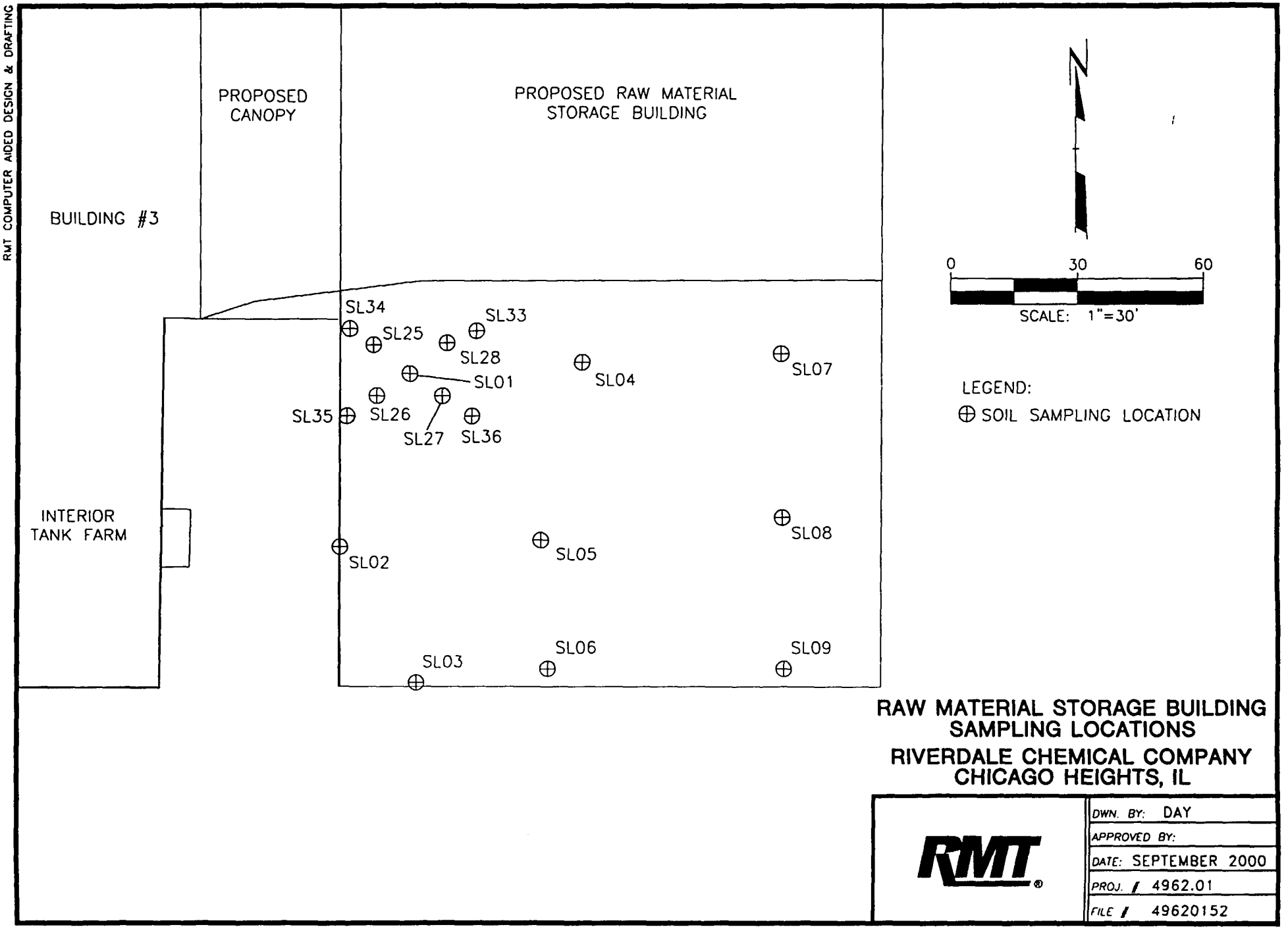
RIVERDALE CHEMICAL COMPANY CHICAGO, HEIGHTS, IL

RMT

DWN. BY:	DAY
APPROVED BY:	
DATE:	SEPTEMBER 2000
PROJ. #	4962.01
FILE #	49620151

FIGURE 3-1

RMT COMPUTER AIDED DESIGN & DRAFTING



RAW MATERIAL STORAGE BUILDING SAMPLING LOCATIONS

RIVERDALE CHEMICAL COMPANY CHICAGO HEIGHTS, IL

RMT

DWN. BY:	DAY
APPROVED BY:	
DATE:	SEPTEMBER 2000
PROJ. #	4962.01
FILE #	49620152

FIGURE 3-2

PLOT DATA
$$DWG$$
$$USER$$
$$PRF$$
$$PTABLE$$
$$PLOTTER$$
$$SCALE$$
$$ROT$$
$$SYTIME$$

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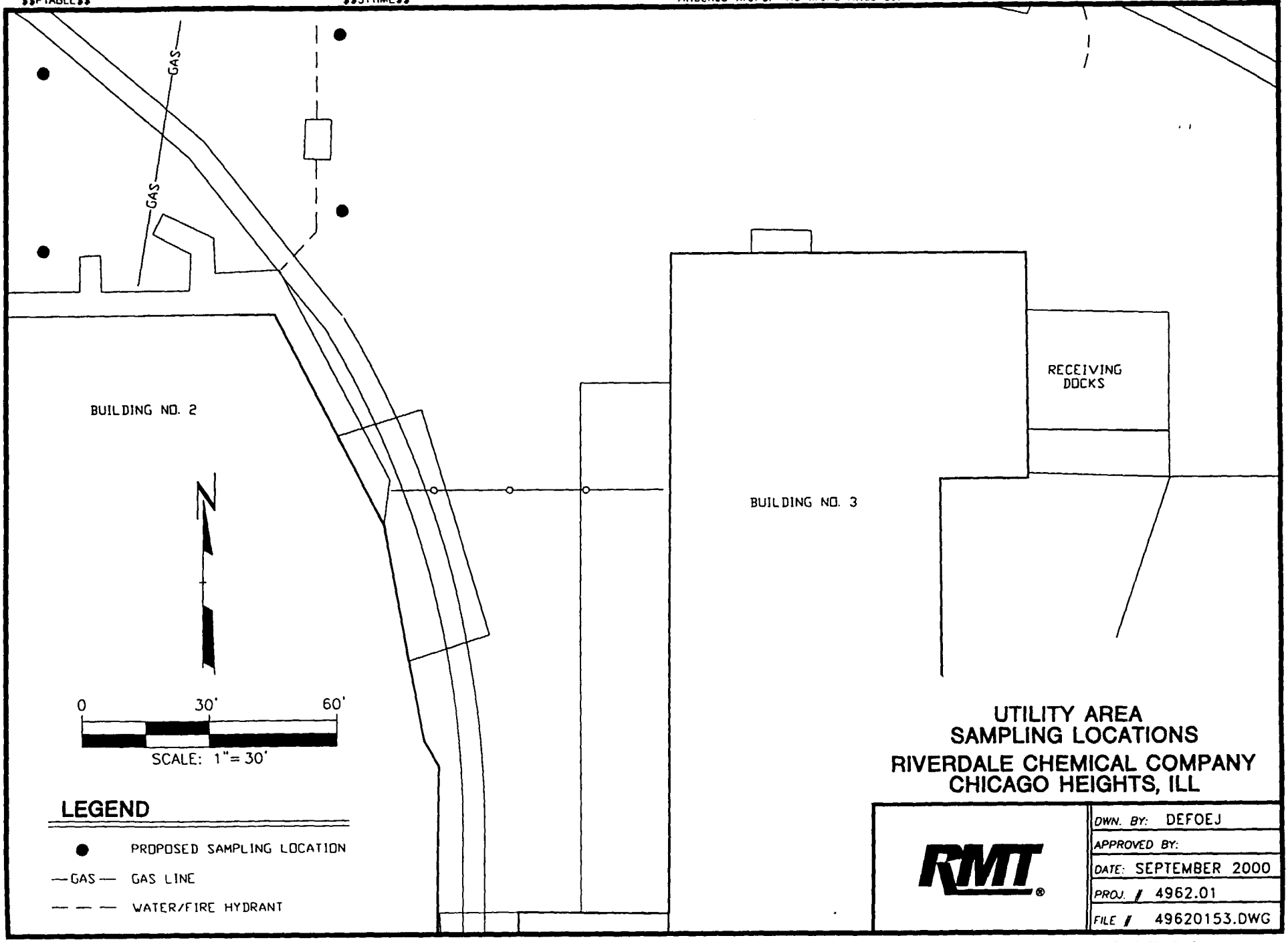
RMT COMPUTER AIDED DESIGN & DRAFTING



UTILITY AREA SAMPLING LOCATIONS

RIVERDALE CHEMICAL COMPANY CHICAGO HEIGHTS, ILL

RMT

DWN. BY:	DEFOEJ
APPROVED BY:	
DATE:	SEPTEMBER 2000
PROJ. #	4962.01
FILE #	49620153.DWG

FIGURE 3-3

PLOT DATA
$$DWG$$
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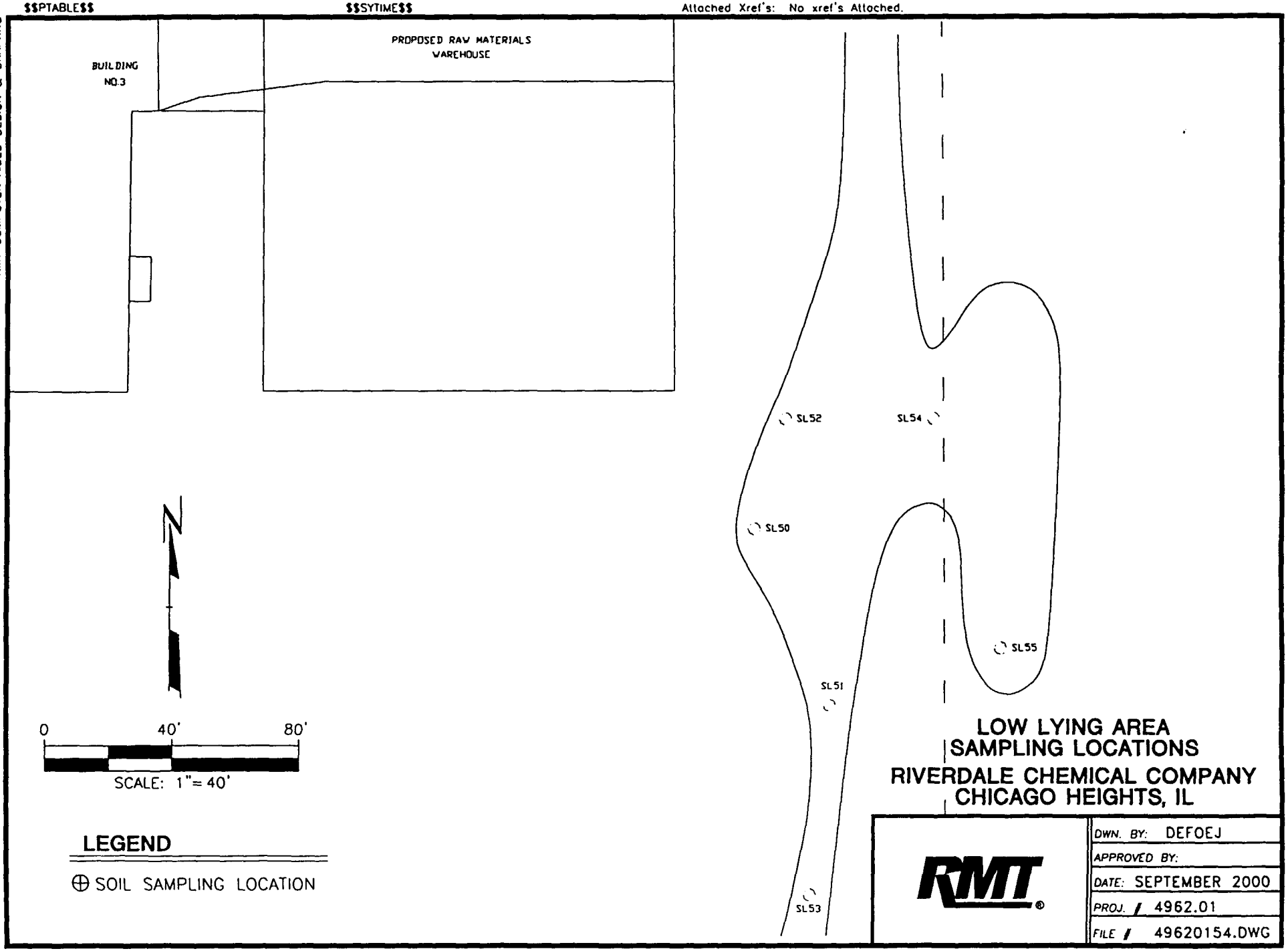
$$ROT$$
$$SYTIME$$

Attached Xref's: No xref's Attached.

RMT COMPUTER AIDED DESIGN & DRAFTING



LEGEND

⊕ SOIL SAMPLING LOCATION

LOW LYING AREA SAMPLING LOCATIONS
RIVERDALE CHEMICAL COMPANY CHICAGO HEIGHTS, IL

RMT

DWN. BY:	DEFOEJ
APPROVED BY:	
DATE:	SEPTEMBER 2000
PROJ. #	4962.01
FILE #	49620154.DWG

FIGURE 3-4

PLOT DATE
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$$ROT$$
$$SYTIME$$
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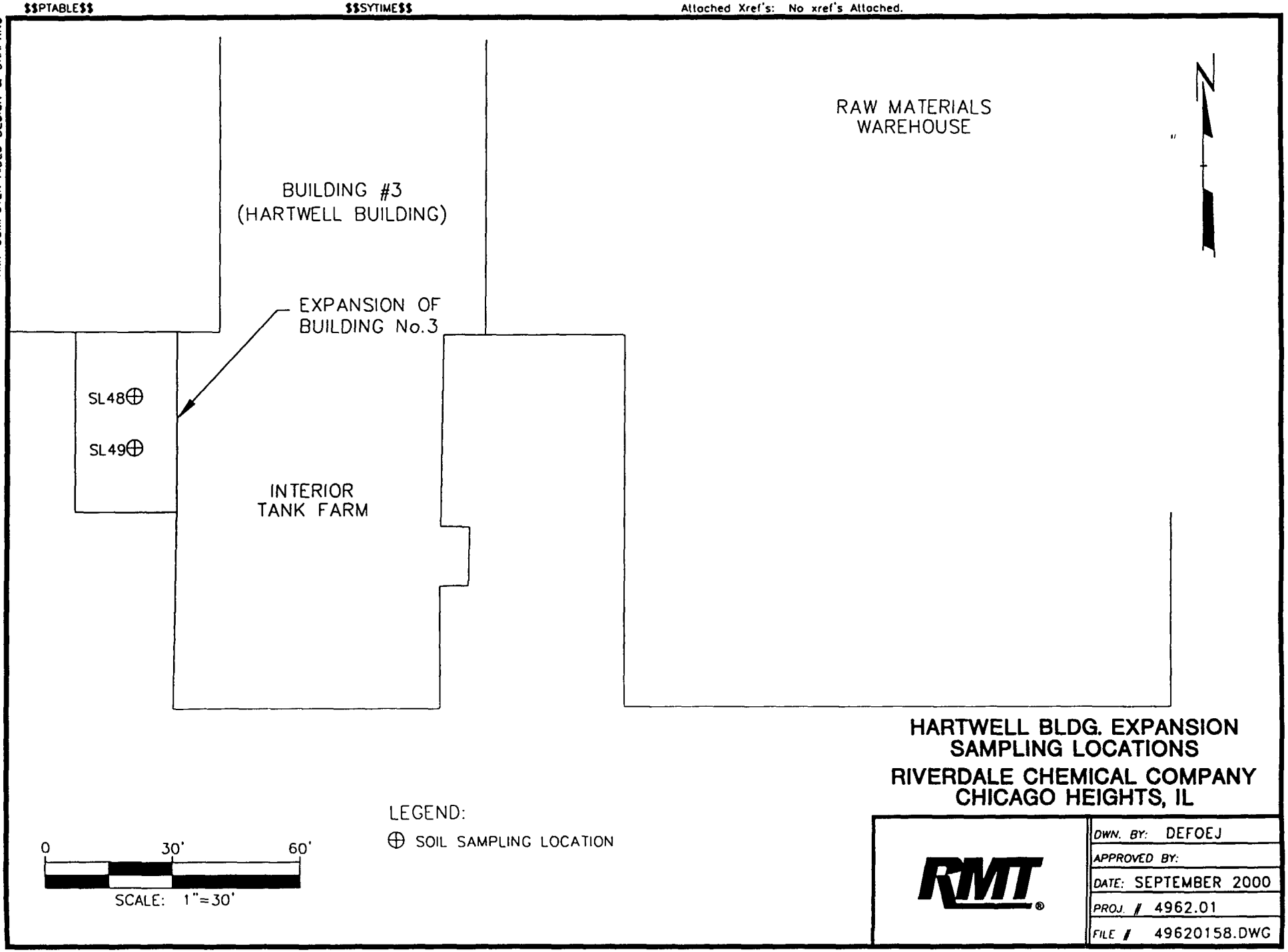

HARTWELL BLDG. EXPANSION SAMPLING LOCATIONS

RIVERDALE CHEMICAL COMPANY CHICAGO HEIGHTS, IL

RMT

DWN. BY:	DEFOEJ
APPROVED BY:	
DATE:	SEPTEMBER 2000
PROJ. #	4962.01
FILE #	49620158.DWG

FIGURE 3-5

PLOT DATA
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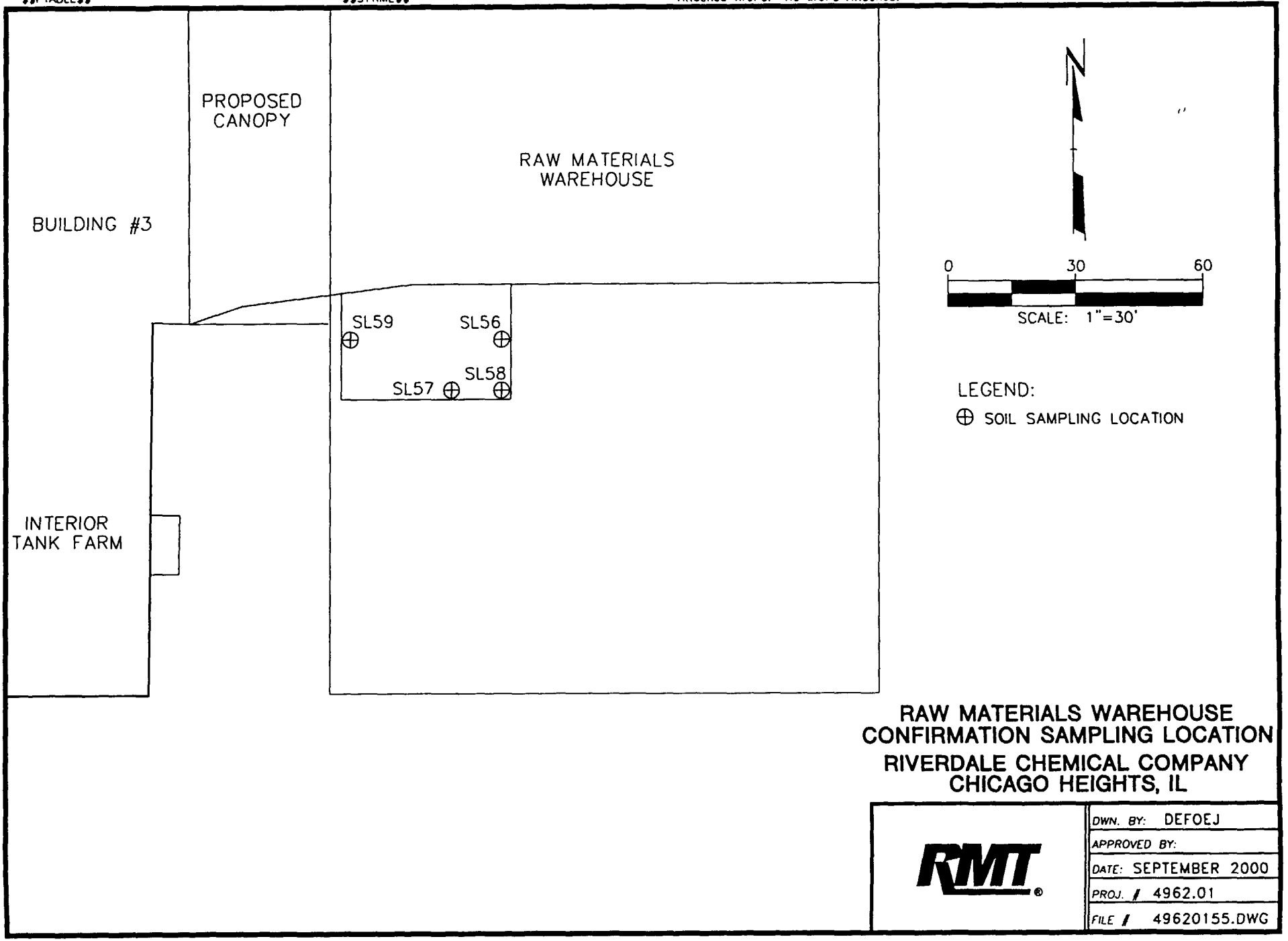

RAW MATERIALS WAREHOUSE CONFIRMATION SAMPLING LOCATION
RIVERDALE CHEMICAL COMPANY
CHICAGO HEIGHTS, IL

RMT®

DWN. BY:	DEFOEJ
APPROVED BY:	
DATE:	SEPTEMBER 2000
PROJ. #	4962.01
FILE #	49620155.DWG

FIGURE 3-6

PLOT DATA
$$DWG$$
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$$ROT$$
$$SYTIME$$
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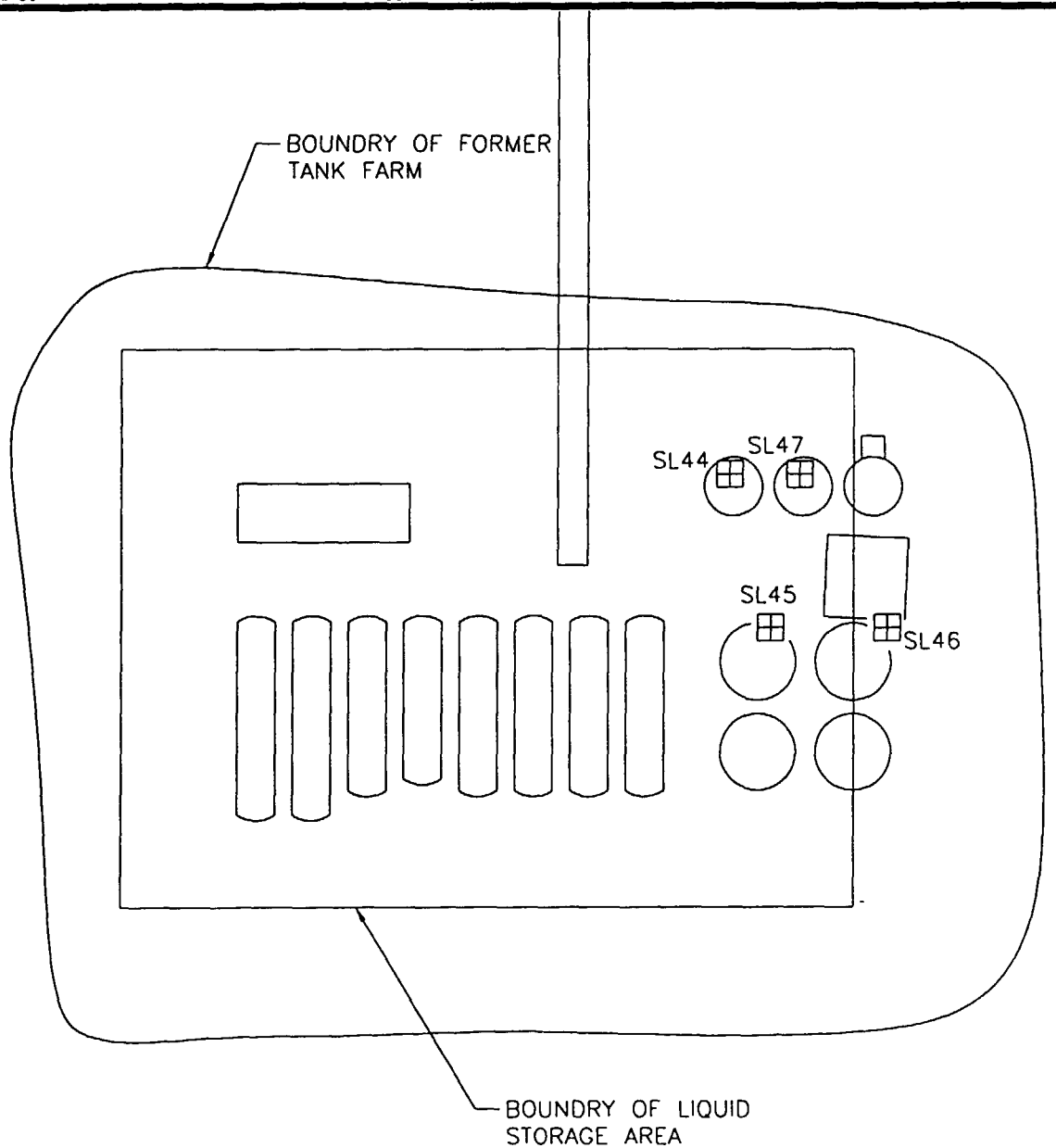

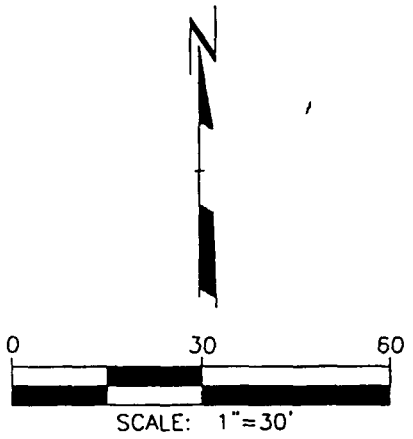

LEGEND:

⊞ SOIL SAMPLING LOCATION

NOTE:

BOUNDRY LINES ARE APPROXIMATE

LIQUID STORAGE AREA CONFIRMATION SAMPLING LOCATION RIVERDALE CHEMICAL COMPANY CHICAGO HEIGHTS, IL

RMT

DWN. BY:	DEFOEJ
APPROVED BY:	
DATE:	SEPTEMBER 2000
PROJ. #	4962.01
FILE #	49620156.DWG

FIGURE 3-7

PLOT DATA
$$DWG$$ $$PLOTTER$$
$$USER$$ $$SCALE$$
$$PRF$$ $$ROT$$
$$PTABLE$$ $$SYTIME$$

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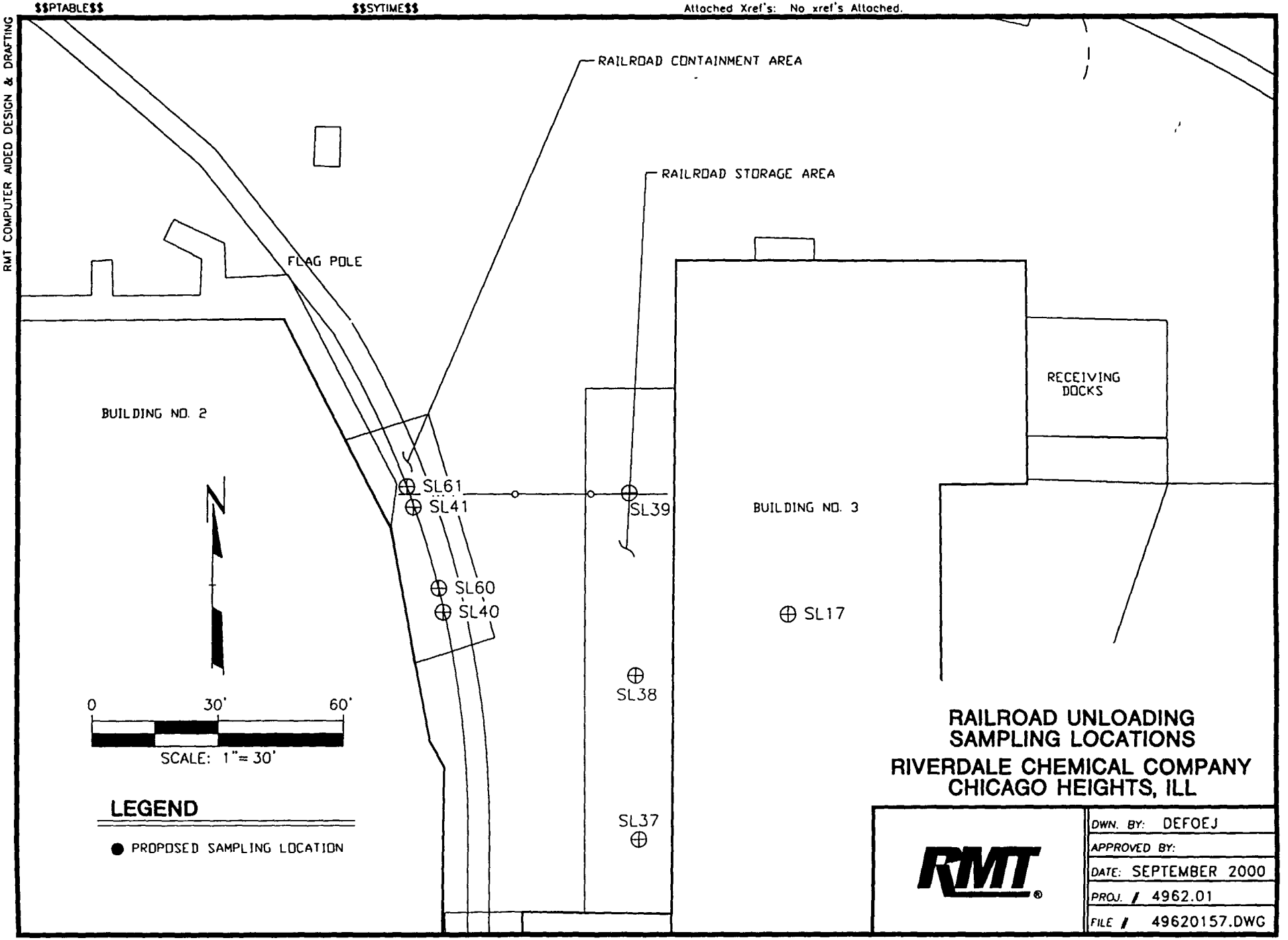
RMT COMPUTER AIDED DESIGN & DRAFTING



RAILROAD UNLOADING SAMPLING LOCATIONS
RIVERDALE CHEMICAL COMPANY
CHICAGO HEIGHTS, ILL

RMT

DWN. BY:	DEFOEJ
APPROVED BY:	
DATE:	SEPTEMBER 2000
PROJ. #	4962.01
FILE #	49620157.DWG

FIGURE 3-8

SECTION 4

Section 4
Project Organization and Management

RMT will complete the Phase I RA outlined in this Workplan, of Chicago, Illinois, under the direction of Riverdale. Riverdale's project coordinator is Dr. Peter Bibby. RMT's project manager is Rae Mindock.

RMT will be responsible for project coordination and management of Phase I RA. RMT will interface with the regulatory agencies in conjunction with Riverdale.

RMT will collect samples and conduct field monitoring activities. STL Laboratories in North Canton, Ohio, Chicago, Illinois and SLT West Sacramento will provide chemical analysis of samples for the Phase I RA activities. Mr. Kenneth J. Kuzior is the laboratory contact person for SLT.

The RMT project manager directs the RMT Phase I RA task leaders. The RMT task leaders will direct staff in their various efforts through completion of the Phase I RA. A summary of each key person's responsibilities is presented below:

Matt Ohl
(Remedial Project Manager, USEPA)

- Overall responsibility for all phases of the Phase I RA for the USEPA

Callie Bolattino
(On Scene Coordinator, USEPA)

- Overall responsibility for site activities associated with the Phase I RA for the USEPA

Peter Bibby, Ph.D.
(Operations Manager, Riverdale)

- Represent Riverdale during Phase I RA activities
- Conduct project review
- Provide the lead for public communications that may be required
- Coordinate final use plans

Rae Mindock.
(Project Manager, RMT, Inc.)

- Provide a focal point for communications between RMT and Riverdale
- Retain original project documents
- Distribute project documents to appropriate entities
- Ensure that professional services are of adequate quality
- Ensure that appropriate resources of RMT and laboratories are available as required for the project
- Conduct overall project review of RMT and laboratories performance
- Provide technical review and support as required during discussions with the USEPA
- Provide overall project management and coordination between the design team and site activities
- Provide overall project QC review

Kathy Huibregtse, P.E.
(Project QA Officer, RMT, Inc.)

- Review project execution and outputs against good engineering practice
- Provide overall project QA

Dave Yaros
(Phase I RA Task Leader)

- Coordinate site activities including sampling and excavation activities
- Participate in key technical discussions and negotiations with the USEPA
- Provide scoping and input to site related activities
- Assist with the management of Phase I RA activities

Kirsti Sorsa
(Analytical Laboratory QA Manager, RMT, Inc.)

- Coordinate chemical analytical services with STL
- Direct RMT data validation and assessment
- Direct RMT analytical performance and system audits of laboratory services, as appropriate
- Prepare data validation reports

On-site Coordinator (OSC), RMT

- Manage on-site activities
- Provide local liaison during field activities
- Ensure that field procedures are implemented in accordance with approved workplan documents
- Ensure that site personnel have necessary training

Surveying and Field Staff

- Assist On-Site Coordinator in oversight activities, as well as field sampling and data collection activities.
- Field-locate and/or document site features and site topography.

Construction Contractor

- Procure materials associated with the Phase I RA construction.
- Implement the construction of the Phase I RA components.

Drilling Subcontractor

- Drill soil borings associated with Phase I RA sampling activities.

Analytical Laboratories

- Perform laboratory analytical services as identified.

SECTION 5

Section 5
Progress Reports

The USEPA will be provided monthly progress reports during the Phase I RA. Monthly progress reports will be submitted to the USEPA, which will include the following:

- A description of the individual tasks and an estimate of the percentage of the completed
- Summaries and discussion of all findings
- Summaries and discussion of all approved and unapproved changes made during the reporting period
- Summaries of all contacts with representatives of the local community, public interest groups, or local or State governments during the reporting period
- Summaries of all problems or potential problems encountered during the reporting period
- Actions being taken to rectify problems
- Changes in personnel during the reporting period
- Projected work for the next reporting period
- Copies of reports generated including, but not limited to, daily reports, inspection reports, and laboratory/monitoring data

Section 6
Project Schedule

The project schedule for the Phase 1 RA is currently under discussion with the USEPA. The construction of the liquid storage area, raw materials warehouse and railroad unloading area must be competed prior to January 1, 2001. Therefore, it is the goal of Riverdale to have the Phase I RA completed prior to January 1, 2001.

The project schedule is outlined below:

- *Field activities and sampling – November 30, 2000*
- *Excavation and disposal of contaminated soil – November 30, 2000*
- *Submittal of the Draft Phase I Removal Action Report – November 30, 2000*
- *Revision and re-submittal of the Phase I Removal Action Report – 30 days after receipt of USEPA comments.*

Riverdale has provided the USEPA with schedules for the construction projects.

Section 7
References

IT Corporation. 1998. Draft Feasibility Study Workplan. Riverdale Chemical Company. Chicago Heights, Illinois.

IT Corporation. 1998. Hydraulic Conductivity Testing of Soils. Riverdale Chemical Company. Chicago Heights, Illinois. April 1998.

RMT, Inc. 2000. Feasibility Study Report, Riverdale Chemical Company. Chicago Heights, Illinois. February 23, 2000.

USEPA. 1984. Administrative Order of Consent for Immediate Response Measures. September 28, 1984.

USEPA. 1985. Administrative Order of Consent for Remedial Investigation/Feasibility Study. Riverdale Chemical Company. Chicago Heights, Illinois. February 27, 1985.

USEPA. 1996. ATSDR Record of Activity. Riverdale Chemical Company. July 29, 1996.

APPENDIX A

Integrated
Environmental
Solutions

222 South Riverside Plaza
Suite 820
Chicago, IL 60606
Telephone: 312-575-0200
Fax: 312-575-0300

APPENDIX A

QUALITY ASSURANCE PROJECT PLAN FOR THE PHASE I REMOVAL ACTION WORKPLAN

RIVERDALE CHEMICAL COMPANY

Prepared For
Riverdale Chemical Company
Chicago Heights, Illinois

Prepared By
RMT, Inc.

September 2000

Dr. Peter Bibby, Riverdale Project Coordinator	Date
Rae Mindock, RMT, Inc., Project Manager	Date
Kathryn Huibregtse, P.E., RMT, Inc., QA Officer	Date
Kirsti Sorsa, RMT, Inc., Analytical QA Manager	Date
Opal Davis-Johnson, STL Laboratories, Inc., QA Manager – pesticides	Date
Pamela Schemmer, STL Laboratories, Inc., QA Manager - dioxin	Date
Matt Ohl, USEPA Region 5, Remedial Project Manager	Date
USEPA Region 5 Quality Assurance Reviewer	Date

Table of Contents

List of Tables

List of Attachments (Separate Volumes)

List of Acronyms/Abbreviations

ASTM	American Society for Testing and Materials
CCB	continuing calibration blank
CCC	calibration check compound
CCV	continuing calibration verification
CLP	Contract Laboratory Program
COC	Chain of Custody
COPC	Compounds of Potential Concern
DQO	Data Quality Objective
FCR	field change request
FSAP	Field Sampling and Analysis Plan
FS	Feasibility Study
FSS	Field Services Section
GC/MS	gas chromatograph/mass spectrophotometer
IDW	Investigation-derived waste
IEPA	Illinois Environmental Protection Agency
LCS	laboratory control sample
LRA	linear range analysis
MDL	Method Detection Limit
mg	milligrams
mL	milliliter
MS	matrix spike
MS/MSD	matrix spike/matrix spike duplicate
MSD	matrix spike duplicate
NA	not applicable
NIST	National Institute of Standards and Technology
OCLP	Organics Contract Laboratory Program
OSC	on-site coordinator
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
R	recovery
RA	Removal Action

RF	response factor
RI	Remedial Investigation
RMT	Residuals Management Technology, Inc.
RPD	relative percent difference
RPM	Remedial Project Manager
RSD	relative standard deviation
RT	retention times
SL	Sampling location
SOP	standard operating procedure
SOW	Statement of Work
SRM	standard reference materials
STL	Severn Trent Laboratories, Inc.
S.U.	standard units
SW846	Test Methods for Evaluating Solid Waste 1986
TBD	to be determined
TCLP	Toxicity Characteristic Leaching Procedure
USEPA	United States Environmental Protection Agency
USCS	Unified Soil Classification System
VOC	volatile organic compound

SECTION 1

Section 1
Project Description

1.1 Introduction

The Phase I RA addresses the contaminated soil at three major areas of construction at the Riverdale Site. These construction areas are: 1) installation of upgraded secondary containment around the liquid storage area (liquid storage area); 2) expansion of the raw materials warehouse (raw materials warehouse); and 3) installation of a spill containment basin at the railroad unloading area (railroad unloading area). In addition, other areas will be evaluated including the utility area, the low lying area in the southeastern side of the site, and the minimal expansion of Building No. 3 (Hartwell Building Expansion). The purpose of this Quality Assurance Project Plan (QAPP) is to present the quality assurance procedures for the collection of soil samples for the tasks to be implemented during the Phase I RA.

The proposed remedy for the site includes excavation and disposal of soil (Phase I RA) and installation of an enhanced asphalt cap (Phase II RA). The Phase I RA includes the collection of additional data necessary to initiate or complete the removal action(s). The components of the Phase I RA include the following:

- Soil sampling within the footprints of the liquid storage area and raw materials warehouse to determine extent of excavation
- Soil sampling in the area where utilities (utility area) are located at the northern end of the site and the expansion of Building No. 3
- Soil sampling in the low lying area located at the southeastern side of the site which the USEPA has described as wetlands
- Soil sampling at the southwest side of Building No. 3 for the Hartwell Building expansion (20 foot by 40 foot pre-engineered building)
- Excavation and off-site disposal of soils (with concentrations of COPCs that exceed a total cancer risk above 1×10^{-4} and noncancer hazard index greater than one) under the proposed liquid storage area, if any, with vertical extent based on the construction requirement; and the horizontal extent defined by confirmatory sampling and the boundaries of the liquid storage area
- Excavation and off-site disposal of soils (with concentrations of COPCs that exceed a calculated total cancer risk of 1×10^{-4} and noncancer hazard index greater than one) under the proposed raw materials warehouse, if any, with the vertical extent limited to five feet bgs; and the horizontal extent defined by confirmatory sampling and the boundaries of the raw materials warehouse

- Excavation and off-site disposal of soils (with concentrations of COPCs that exceed a calculated total cancer risk above 1 x 10^{-4} and noncancer hazard index greater than one) under the railroad unloading area, with vertical extent limited to eight feet bgs and horizontal extent defined by the boundaries of the spill containment area and the 20,000 gallon storage area
- Installation of a utility corridor or excavation and off-site disposal of soils (with concentrations of COPCs that exceed a calculated total cancer risk of 1 x 10^{-4} and noncancer hazard index greater than one) at the utility area, if any, with the vertical extent based on the depth of utilities and the horizontal extent defined by confirmatory sampling adjacent to the buried utilities
- Characterization of excavated soils to determine off-site disposal requirements

1.2 Site Description and Past Data Collection Activities

The Riverdale Chemical Company in Chicago Heights, Illinois, is an active facility used for the formulation and packaging of various agricultural and turf chemicals. Riverdale has been conducting an RI/FS under an AOC at the site since 1985. Information including a description of the site, previous activities is provided in the Phase I RA Workplan and the Field Sampling and Analysis Plan (FSAP) provided as Appendix B of the Workplan. See Table 1-1.

1.3 Objective of the Phase I Removal Action

The objective of the soil sampling is twofold: a) to confirm the extent, if any, of concentrations of COPCs that exceed a calculated total cancer risk above 1 x 10^{-4} and noncancer hazard index greater than one under the liquid storage area, railroad unloading area, the raw materials warehouse and in the vicinity of the utility area, and b) to confirm the presence of COPCs, if any, in the low lying area at the southeastern side of the site and at expansion of Building No. 3.

1.3.1 Specific Objectives and Associated Tasks

The Phase I RA will include the soil sampling in the vicinity of the raw materials warehouse, the liquid storage area, the railroad unloading area, the utility area, and the low lying area at the southeastern side of the site, and at the expansion of Building No. 3. The scope of work for each of the areas is described in the FSAP.

1.3.2 Project Target Parameters and Intended Data Usages

The list of target parameters for the Phase I RA is included in Tables 3-2 and 3-3 of this QAPP. The intended data usages are summarized in Table 1-3.

1.3.3 Quality Objectives and Criteria for Measurement Data

The Data Quality Objective (DQO) Process is a series of planning steps based on the Scientific Method that is designed to ensure that the type, quality, and quantity of environmental data used in decision making are appropriate for intended application.

DQOs are qualitative and quantitative statements derived from outputs of each step of the DQO Process that:

- Clarify the study objective;
- Define the most appropriate type of data to collect; and
- Determine the most appropriate conditions from which to collect the data.

The DQOs developed for soil were used to develop a scientific and resource-effective sampling design and were based on the seven step process described in the EPA QA/G-4 (September 1994) document.

1.4 Sample Network Design and Rationale

The soil sampling network design and rationale for sample locations are described in detail in Table 1-4 of this QAPP, and in the FSAP.

1.4.1 Sample Network by Task and Matrix

Sample matrices, analytical parameters, and frequencies of soil sample collection can be found in Table 1-2.

1.4.2 Site Maps of Sampling Locations

Maps showing sampling locations are included as Figures in the FSAP, which is fully incorporated into this QAPP through reference. It is possible, however, that depending on the nature of encountered field conditions, some of these locations will be changed. The person who will be responsible for making such decisions will be the On-site Coordinator whose responsibilities are described in Section 2 of this QAPP.

1.4.3 Rationale of Selected Sampling Locations

The rationale for why the selected sampling locations were chosen is described in Table 1-4.

1.5 Project Schedule

The construction of the liquid storage area, raw materials warehouse and railroad unloading area must be completed prior to January 1, 2001. Therefore, it is the goal of Riverdale to have the Phase I RA completed prior to January 1, 2001. The schedule is provided in Section 6 of the Work Plan.

Table 1-1
Summary of Ranges of Anticipated Soil Sampling Results

COMPOUND	RANGE OF ANTICIPATED RESULTS IN SOIL	SOIL UNITS
Aldrin	0.018 - 530	mg/kg
Chlordane	0.013 - 1100	mg/kg
Dieldrin	0.049 - 210	mg/kg
Heptachlor	0.018 - 68	mg/kg
Heptachlor epoxide	0.021 - 16	mg/kg
Toxaphene	160	mg/kg
2,3,7,8-TCDD[2]	0.00018-0.197	mg/kg

Notes:
NA = not applicable.
(1) Ranges based on sampling results from the RI and FIT sampling.
2) 2,3,7,8-TCDD (2,3,7,8-tetrachlorodibenzo-p-dioxin)

Table 1-2
Summary Table of Sampling and Analysis Program

MATRIX	ANALYTICAL GROUPS[1]	TOTAL SAMPLES	DUPLICATE SAMPLES	MS/MSD	TOTALS[2]
Soil					
Horizontal Sampling					
Raw Materials	Pesticides[3]	32	3	2	35
	Dioxin[4]	2	0	1	2
Liquid Storage	Pesticides	25	3	2	28
	Dioxin	3	0	1	3
Utility Area	Pesticides	8	1	1	9
	Dioxin	0	0	0	0
Low Lying Area	Pesticides	9	1	1	10
	Dioxin	2	1	1	3
Soil					
Confirmatory Sampling					
Raw Materials	Pesticides	4	0	0	4
	Dioxin	0	0	0	0
Liquid Storage	Pesticides	4	0	0	4
	Dioxin	0	0	0	0
Railroad Unloading	Pesticides	8	0	0	8
	Dioxin	0	0	0	0
Utility Area	Pesticides	TBD[5]	TBD	TBD	TBD
	Dioxin				
Soil					
Disposal Characterization					
Raw Materials	TCLP	2	0	0	2
Liquid Storage	TCLP	1	0	0	1
Railroad Unloading	TCLP	2	0	0	2

Notes:

Analytical groups are defined as follows:

(1) Pesticides and Dioxin (2,3,7,8 TCDD): See Table 2-1 of the FSAP.

(2) Total reflects that each MS/MSD is not counted as an additional sample.

(3) Pesticide chemical analyses conducted by analytical method described in the QAPP.

(4) Dioxin chemical analyses conducted by analytical method described in the QAPP.

(5) TBD – To be determined if excavation is required.

Table 1-3
Intended Data Usage

ACTIVITY	DESCRIPTION	INTENDED DATA USAGE	PARAMETERS
Soil Sampling and Confirmatory Sampling			
Soil Sampling	Soil samples collected at approximately 2-ft bgs (the first interval with recovery) and at 4-ft bgs In the low lying area, soil samples collected at approximately 0.5-ft bgs (the first interval with recovery) and at 3-ft bgs	To confirm the extent, if any, of concentrations of COPCs that exceed a calculated total cancer risk above 1 x 10^{-4} and noncancer hazard index greater than one	Pesticide COPCs with selected samples for 2,3,7,8 TCDD In the low lying area, full TCL and TAL
Confirmatory Sampling	Soil samples collected at base of excavation	To confirm the level of residual contamination, if any	Pesticide COPCs with selected samples for 2,3,7,8 TCDD
Disposal Characterization			
Excavated Areas	Soil from excavation and equipment decontamination	Decision-making regarding disposal of excavated soil and IDW management	TCLP(2)

Notes:
(1) Pesticide list for soil: see Table 3-2.
(2) See Table 3-3.

Table 1-4
Rationale for Sampling Locations

Sample Location	Locations	Rationale
Soil Sampling (Horizontal)		
Raw Materials Warehouse	Nineteen locations	Collected at 2 ft bgs and 4 ft bgs to confirm the extent, if any, of concentrations of COPCs that exceed a calculated total cancer risk above 1×10^{-4} and noncancer hazard index greater than one
Liquid Storage Area	Seventeen locations	Collected at 2 ft bgs and 4 ft bgs to confirm the extent, if any, of concentrations of COPCs that exceed a calculated total cancer risk above 1×10^{-4} and noncancer hazard index greater than one
Utility Area	Four locations	Collected at 2 ft bgs and 4 ft bgs to confirm the extent, if any, of concentrations of COPCs that exceed a calculated total cancer risk above 1×10^{-4} and noncancer hazard index greater than one
Low Lying Area	Six locations	Collected at 2 ft bgs and 4 ft bgs to confirm the extent, if any, of concentrations of COPCs that exceed a calculated total cancer risk above 1×10^{-4} and noncancer hazard index greater than one
Expansion of Building No. 3	Two locations	Collected at 2 ft bgs and 4 ft bgs to confirm the extent, if any, of concentrations of COPCs that exceed a calculated total cancer risk above 1×10^{-4} and noncancer hazard index greater than one
Confirmatory Sampling		
Raw Materials Warehouse	Four samples	Collected at base of excavation
Liquid Storage Area	Four samples	Collected at base of excavation to confirm the level of residual contamination, if any
Railroad Unloading Area	Five samples	Collected at base of excavation to confirm the level of residual contamination, if any
Utility Area	One to five samples (based on results of horizontal sampling)	Collected at base of excavation to confirm the level of residual contamination, if any
Disposal Characterization		
Raw Materials Warehouse	Two	Collect from soil stock pile to characterize soils for off-site disposal
Liquid Storage Area	One	Collect from soil stock pile to characterize soils for off-site disposal
Railroad Unloadingt Area	Two	Collect from soil stock pile to characterize soils for off-site disposal

SECTION 2

Section 2
Project Organization and Responsibility

RMT has overall responsibility for the Phase I RA. RMT will perform the field investigation and will be responsible for project management. The various quality assurance and management responsibilities of key project personnel are defined below.

2.1 Project Organization

The lines of authority for this specific project are described in the Phase I RA Workplan.

2.2 Management Responsibilities

- *USEPA Remedial Project Manager* - The USEPA Remedial Project Manager (RPM) has the overall responsibility for the Phase I RA. Table 2-1 provides contact information for the USEPA RPM and other key Phase I RA personnel.
- *Riverdale Project Coordinator* - The Riverdale Project Coordinator is responsible for implementing the project and has the authority to commit the resources necessary to meet project objectives and requirements. The Project Coordinator will report directly to the USEPA RPM and will provide the major point of contact and control for project issues. The Project Coordinator will represent the Riverdale project team at meetings and public hearings.
- *RMT Project Manager* - The Project Manager is responsible for implementing the project. The project manager's primary function is to ensure that technical, financial, and scheduling objectives are achieved successfully. The Project Manager will report directly to the Riverdale Project Coordinator. The Project Manager will:
    - Define project objectives and supervise development of a detailed workplan schedule;
    - Establish project policy and procedures to address the specific needs of the project as a whole, as well as the objectives of each task;
    - Acquire and apply resources as needed to ensure performance within budget and schedule constraints;
    - Orient Task Leaders and support staff concerning the project's special considerations;
    - Monitor and direct the Task Leaders;
    - Develop and meet ongoing project and/or task staffing requirements, including mechanisms to review and evaluate each task product;

- Review the work performed on each task to ensure its quality, responsiveness, and timeliness;
- Review and analyze overall task performance with respect to planned requirements and authorizations;
- Approve all reports (deliverables) before their submission to USEPA Region 5; and
- Ultimately be responsible for the preparation and quality of interim and final reports.

The management of laboratory services is provided in Subsection 2.5 of this QAPP.

2.3 Quality Assurance (QA) Responsibilities

- *RMT QA Officer* - The RMT QA Officer will remain independent of direct job involvement and day-to-day operations, and have direct access to resources as necessary, to resolve any QA dispute. The QA Officer is responsible for auditing the implementation of the QA program in conformance with the demands of specific investigations, RMT's policies, and USEPA requirements. Specific functions and duties include:
  - Providing QA audit on various phases of the field operations;
  - Reviewing and approving of QA plans and procedures;
  - Providing QA technical assistance to project staff; and
  - Reporting on the adequacy, status, and effectiveness of the QA program.

  See Table 2-1 for the name of the RMT QA Officer for the Riverdale Site.
- *RMT Analytical QA Manager* - The RMT Analytical QA Manager reports directly to the RMT Project Manager and will be responsible for ensuring that all RMT procedures for this project are being followed. In addition, the RMT Analytical QA Manager will be responsible for the data validation of all sample results from the analytical laboratory.
- *USEPA Region 5 Superfund Division, Field Services Section (FSS) Quality Assurance Reviewer* - EPA Quality Assurance Reviewer has the responsibility to review and approve all Quality Assurance Project Plans (QAPPs).

The quality assurance responsibilities within the laboratory are provided in Subsection 2.5 of the QAPP.

2.4 Field Responsibilities

- ***Phase I RA Task Leader*** - The RMT Project Manager will be supported by the Task Leader. The Task Leader is responsible for leading and coordinating the day-to-day activities of the various resource specialists under his/her supervision. The Task Leader is a highly experienced environmental professional and will report directly to the RMT Project Manager. Specific Task Leader responsibilities include:
    - Provision of day-to-day coordination with the Project Manager on technical issues in specific areas of expertise;
    - Developing and implementing of field-related workplans, assurance of schedule compliance, and adherence to management-developed study requirements;
    - Coordinating and managing of field staff including sampling, drilling, and supervising field laboratory staff;
    - Implementing of QC for technical data provided by the field staff including field measurement data;
    - Adhering to work schedules provided by the Project Manager;
    - Authoring, writing, and/or approving of text and graphics required for field team efforts;
    - Coordinating and overseeing of technical efforts of subcontractors assisting the field team;
    - Identifying problems at the field team level, resolving difficulties in consultation with the project manager, implementing and documenting corrective action procedures, and provision of communication between team and upper management; and
    - Participating in preparation of the final report.

  Per Table 2-1, one team leader has been identified. The Phase I RA Task Leader will lead the Phase I RA, with emphasis on the evaluation of contamination magnitude.

  RMT Field Technical Staff - The technical staff for this project will be drawn from RMT's pool of resources. The technical team staff will be utilized to gather and analyze data, and to prepare various task reports and support materials. All of the designated technical team members are experienced professionals who possess the degree of specialization and technical competence required to effectively and efficiently perform the required work. An On-site Coordinator (OSC) will be designated for this project. The OSC will be in charge of field operations and technical staff, and will report to the Phase I RA Task Leader as appropriate. The OSC responsibilities include the following:
    - Communicating QC procedures to field staff;
    - Auditing of field performance; and
    - Initiation of corrective actions in consultation with Task Leader.

2.5 Laboratory Responsibilities

2.5.1 STL Laboratories, Inc.

STL Laboratories, 101 Shuffel Drive, N.W., North Canton, OH 44720, will perform all pesticide soil analyses. STL Laboratories, 880 Riverside Parkway, West Sacramento, CA 95605, will perform dioxin analyses. Specific analytes are provided in Section 3 of the QAPP.

- *STL Laboratories, Inc. Project Manager* - The STL Laboratories, Inc. Project Manager will report directly to the RMT Project Manager and will be responsible for the following:
  - Ensuring all resources of the laboratory are available on an as-required basis; and
  - Overviewing of final analytical reports.
- *STL Laboratories, Inc. Operations Manager* - The STL Laboratories, Inc. Operations Manager will report to the STL Laboratories, Inc. Project Manager and will be responsible for:
  - Coordinating laboratory analyses;
  - Supervising in-house chain-of-custody;
  - Scheduling sample analyses;
  - Overseeing data review;
  - Overseeing preparation of analytical reports; and
  - Approving final analytical reports prior to submission to RMT.
- *STL Laboratories, Inc. Quality Assurance Manager* - The STL Laboratories, Inc. QA Officer has the overall responsibility for data after it leaves the laboratory. The STL Laboratories, Inc. QA Officer will be independent of the laboratory but will communicate data issues through the Laboratory Project Manager. In addition, the STL Laboratories, Inc. QA Officer will:
  - Overview laboratory quality assurance;
  - Overview QA/QC documentation;
  - Conduct detailed data review;
  - Determine whether to implement laboratory corrective actions, if required;
  - Define appropriate laboratory QA procedures;
  - Prepare laboratory Standard Operation procedures; and
  - Sign the title page of the QAPP.

- *STL Laboratories, Inc. Sample Custodian* - The STL Laboratories, Inc. sample custodian will report to the STL Laboratories, Inc. Operations Manager. Responsibilities of the STL Laboratories, Inc. sample custodian will include:
  - Receiving and inspecting the incoming sample containers;
  - Recording the condition of the incoming sample containers;
  - Signing appropriate documents;
  - Verifying chain-of-custody and its correctness;
  - Notifying laboratory manager and laboratory supervisor of sample receipt and inspection;
  - Assigning a unique identification number and customer number, and entering each into the sample receiving log;
  - With the help of the laboratory manager, initiating transfer of the samples to appropriate lab sections; and
  - Controlling and monitoring access/storage of samples and extracts.

  Final responsibility for project quality rests with RMT's Project Manager. Independent quality assurance will be provided by the STL Laboratories, Inc. Project Manager and QA Officer prior to release of all data to RMT.
- *STL Laboratories, Inc. Technical Staff* - The STL Laboratories, Inc. technical staff will be responsible for sample analysis and identification of corrective actions. The staff will report directly to the STL Laboratories, Inc. Operations Manager.

2.6 Records Management

- *RMT Records Management Manager* – The Records Management Manager is responsible for the protection of the organization's assets through systematic review and control of information. This protection is provided through the development and implementation of policies and procedures that will establish consistency with the records management program. The Records Management Manager works closely with the user base to evaluate, research and recommend information management solutions. Specific functions and duties include:
  - Operates and maintains Records Management systems, including creation, receipt, storage, retrieval and disposition;
  - Develops plan and design of the organizations vital records protection, disaster protection and recovery efforts;
  - Ensures adherence to legal requirements which affect the information of the organization or transfer of information in the organization;
  - Provides expertise and guidance to others throughout the organization on records management services; and

- Coordinates staff and equipment resources to provide efficient usage of information throughout organization.

Table 2-1
Riverdale Site Key Personnel Contact Information

POSITION	CONTACT
USEPA RPM	Matt Ohl Remedial Project Manager USEPA - Region V 77 West Jackson Boulevard Chicago, IL 60604-3504 Phone: 312-886-2940 Fax: 312-886-4071 Callie Bolattino On Scene Coordinator Phone: 312-353-3490 Fax: 312-353-3490
Riverdale Project Coordinator	Peter Bibby, Ph.D. Operations Manager 220 East 17th Street Chicago Heights, IL 60411 Phone: 708-756-2010 Fax: 708-756-2026
RMT Project Manager	Rae Mindock Project Manager RMT, Inc. 222 South Riverside Plaza, Suite 820 Chicago, IL 60606 Phone: 312-575-0200 Fax: 312-575-0200 e-mail: rae.mindock@rmtinc.com
RMT Project QA Officer	Kathryn Huibregtse, P.E. Consulting Engineer RMT, Inc. 150 North Patrick Boulevard, Suite 180 Brookfield, WI 53045-5854 Phone: 262-879-1212 Fax: 262-879-1220 email: kathy.huibregtse@rmtinc.com

Table 2-1
Riverdale Site Key Personnel Contact Information

POSITION	CONTACT
RMT Analytical QA Manager	Kirsti Sorsa, Ph.D. RMT QA Officer RMT, Inc. 744 Heartland Trail Madison, WI 53717-1934 Phone: 608-662-5338 Fax: 608-831-3334 email: kirsti.sorsa@rmtinc.com
STL Laboratory QA Manager - Pesticides	Opal Davis-Johnson STL Laboratories, Inc. 4101 Shuffel Drive, N.W. North Canton, OH 44720 Phone: 330-497-9396 Fax: 330-497-0772
STL Laboratory QA Manager - Dioxin	Pamela Schemmer STL Laboratories, Inc. 880 Riverside Parkway West Sacramento, CA 95605 Phone: 916-373-5600 Fax: 916-372-1059
RMT Phase I Removal Action Task Leader	David A. Yaros Environmental Engineer RMT, Inc. 222 South Riverside Plaza, Suite 820 Chicago, IL 60606 Phone: 312-575-0200 Fax: 312-575-0300 email: david.yaros@rmtinc.com
Phase II Removal Action Task Leader	David A. Yaros Environmental Engineer RMT, Inc. 222 South Riverside Plaza, Suite 820 Chicago, IL 60606 Phone: 312-575-0200 Fax: 312-575-0300 email: david.yaros@rmtinc.com

Table 2-1
Riverdale Site Key Personnel Contact Information

POSITION	CONTACT
RMT Records Management Manager	Terry Walsh Records Manager 744 Heartland Trail Madison, WI 53717-1934 Phone: 608-662-5239 Fax: 608-831-3334 email: terry.walsh@rmtinc.com

SECTION 3

Section 3
Quality Assurance Objectives for Measurement Data

The overall QA objective for this project is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results that support the requirements of the Phase I RA Workplan. Specific procedures for sampling, chain-of-custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal quality control, audits, preventive maintenance of field equipment, and corrective action are described in other sections of this QAPP.

SOPs for laboratory analyses are provided in Attachments A, B, and C of the QAPP. These include the required accuracy, precision, and sensitivity of the analyses. SOPs for the field chemical analyses are provided in the Field Sampling and Analysis Plan (FSAP) appended to the Phase I RA Workplan. Accuracy and precision requirements for field analyses are also included in the FSAP.

3.1 Precision

3.1.1 Definition

Precision is a measure of the degree to which two or more measurements are in agreement.

3.1.2 Field Precision Objectives

Field precision is assessed on the basis of reproducibility of multiple instrument readings and through the collection and measurement of field duplicates at a rate of 1 duplicate per 10 analytical samples. The total number of duplicates for this project is found in the FSAP.

3.1.3 Laboratory Precision Objectives

Precision in the laboratory is assessed through the calculation of relative percent differences (RPD) between MS/MSD. The equations to be used for precision in this project can be found in Section 12 of this QAPP. Method-specific laboratory precision control limits will be applied as described in the CLP SOW and in the analytical

methods and laboratory SOPs for the non-CLP parameters. Precision control limits are also presented in Table 3-1 and are included in the provided SOPs.

3.2 Accuracy

3.2.1 Definition

Accuracy is the degree of agreement between an observed value and an accepted reference value.

3.2.2 Field Accuracy Objectives

Accuracy in the field is assessed using daily instrument calibration and calibration checks; through the use of field blanks; and through the adherence to all sample handling, preservation, and holding times. A summary of blank collection is provided in Section 4 of the FSAP.

3.2.3 Laboratory Accuracy Objectives

Laboratory accuracy is assessed through the analysis of matrix spikes (MS) or standard reference materials (SRM) and the determination of percent recoveries. The equation to be used for accuracy in this project can be found in Section 12 of this QAPP. Method-specific laboratory accuracy control limits will be applied as described in the CLP SOW and in the analytical methods for the non-CLP parameters. Accuracy control limits for pesticides and dioxins are also presented in Tables 3-1 and 3-1a, and are included in the SOPs (Attachment A).

3.3 Sensitivity

The sensitivity of the laboratory analyses, expressed as quantitation limits, are provided on Tables 3-2 and 3-3 of the QAPP.

3.4 Completeness

3.4.1 Definition

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions.

3.4.2 Field Completeness Objectives

Field completeness is a measure of the amount of valid measurements obtained from all the measurements taken for the project. The equation for completeness is presented in Section 12 of this QAPP. Field completeness for this project will be greater than 90 percent.

3.4.3 Laboratory Completeness Objectives

Laboratory completeness is a measure of the amount of valid measurements obtained from all the measurements taken for the project. The equation for completeness is presented in Section 12 of this QAPP. Laboratory completeness for this project will be greater than 95 percent.

3.5 Representativeness

3.5.1 Definition

Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition.

3.5.2 Measures to Ensure Representativeness of Field Data

Representativeness is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the FSAP is followed and that proper sampling techniques are used.

3.5.3 Measures to Ensure Representativeness of Laboratory Data

Representativeness in the laboratory is ensured by using the proper analytical procedures, meeting sample-holding times and analyzing and assessing field duplicate samples. The sampling network is designed to provide data representative of facility conditions. During development of this network, consideration is given to past waste disposal practices, existing analytical data, physical setting and processes, and constraints inherent to the Superfund program. The rationale of the sampling network is discussed in detail in the FSAP.

3.6 Comparability

3.6.1 Definition

Comparability is an expression of the confidence with which one data set can be compared with another. Comparability is also dependent on similar QA objectives.

3.6.2 Measures to Ensure Comparability of Field Data

Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the FSAP is followed and that proper sampling techniques are used. The Phase I RA techniques in the FSAP have also been selected to provide comparability with data collected during the earlier RI.

3.6.3 Measures to Ensure Comparability of Laboratory Data

Planned analytical data will be comparable when similar sampling and analytical methods are used and documented in the QAPP. For pesticides, CLP procedures will be used for the Phase I RA to maintain comparability with the earlier RI. USEPA-approved methods (SW-846) will be used for the analysis of dioxins and furans (2,3,7,8-tetrachlorodibenzo-p-dioxin/tetrachlorodibenzofuran) and the analysis of the TCLP leachates for investigative derived waste. Comparability is also dependent on similar QA objectives.

3.7 Level of Quality Control Effort

Method blank, duplicate, standard reference materials (SRM) and matrix spike/matrix spike duplicate samples will be analyzed to assess the quality of the data resulting from the field sampling and analytical programs.

Method blank samples are generated within the laboratory and used to assess contamination resulting from laboratory procedures. Duplicate samples are analyzed to check for sampling and analytical reproducibility. Matrix spikes provide information about the effect of the sample matrix on the sample preparation and measurement methodology. All matrix spikes are performed in duplicate and are hereafter referred to as MS/MSD samples. One matrix spike/matrix spike duplicate will be collected for every 20 or fewer investigative samples.

MS/MSD samples are internal laboratory quality control samples. One MS/MSD sample will be collected/designated for every 20 or fewer investigative samples per sample matrix (*i.e.*, soil). The FSAP provides a summary of MS/MSD collection level of effort.

Table 3-1
Laboratory Accuracy and Precision Objectives for Soil[1]

ANALYTE	LABORATORY CONTROL SAMPLE RECOVERY[2] (%)	MATRIX SPIKE RECOVERY SOIL (%)	RELATIVE PERCENT DIFFERENCE SOIL
Lindane		34 -132	43
Chlordane		50 -150	50
Dieldrin		31 -134	38
Heptachlor		50 -150	50
Heptachlor epoxide		50 -150	50
Toxaphene		50 -150	50
2,3,7,8-TCDD	70 - 115	70 - 115	20

Note:

1) All chemical analyses conducted by analytical method CLP SOW OLM03.1, USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration; Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846; and Laboratory-specific operating procedures are provided in Attachment A to the QAPP.

2) Laboratory Control Sample Recovery not specified by CLP.

Table 3-1a
Pesticide Surrogate Compound and 2,3,7,8-TCDD Internal Standard Recovery Limits

	% Recovery (soil)
Decachlorobiphenyl	30 - 150
Tetrachloro-m-xylene	30 - 150
^{13}C-2,3,7,8-TCDD	40 - 120

Note:

All chemical analyses conducted by analytical method OCLP OLM03.2 as described in the USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration.

Table 3-2
Pesticide List and Target Quantitation Limits[1]

COMPOUND	CAS NUMBER	TARGET QUANTITATION LIMITS SOIL (µg/kg)
Aldrin	309-00-2	1.7
Chlordane (Technical)	57-74-9	1.7
Dieldrin	60-57-1	3.3
Heptachlor	76-44-8	1.7
Heptachlor epoxide	1024-57-3	1.7
Toxaphene	8001-35-2	170
2,3,7,8-TCDD	1746-01-6	0.25-5

Notes:

[1] All chemical analyses conducted by analytical method CLP SOW OLM03.1, USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration; Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846; and Laboratory-specific operating procedures are provided in Attachment A to the QAPP.

Table 3-3
TCLP Parameters for Excavated Soils Testing

TCLP Constituent	Target Quantitation Limit (mg/L)	TCLP Regulatory Level (mg/L)
Metals		
Arsenic	0.01	5.0
Barium	10	100
Cadmium	0.002	1.0
Chromium	0.005	5.0
Lead	0.003	5.0
Mercury	0.002	0.2
Selenium	0.005	1.0
Silver	0.005	5.0
Pesticides		
Chlordane (technical)	0.005	0.03
Endrin	0.0005	0.02
Heptachlor	0.0005	0.008
Lindane	0.0005	0.4
Methoxychlor	0.001	10.0
Toxaphene	0.02	0.5
Semivolatiles (a)		
O-Cresol	0.05	200
m-Cresol	0.1	200
p-Cresol	0.1	200
Cresol*	0.1	200
2,4,5-Trichlorophenol	0.05	400
2,4,6-Trichlorophenol	0.05	2
Pentachlorophenol	0.1	100

Constituent	Target Quantitation Limit (mg/L)	TCLP Regulatory Level (mg/L)
Herbicides		
2,4,5-TP Silvex	0.1	1.0
2,4-D	0.5	10.0
Semivolatiles (b/n)		
1,4-Dichlorobenzene	0.05	7.5
2,4-Dinitrotoluene	0.05	0.13
Hexachlorobenzene	0.05	0.13
Hexachlorobutadiene	0.05	0.5
Hexachloroethane	0.05	3.0
Nitrobenzene	0.05	2.0
Pyridine	0.1	5.0
Volatiles		
Benzene	0.025	0.5
Carbon tetrachloride	0.025	0.5
Chlorobenzene	0.025	100.0
Chloroform	0.025	6.0
1,2-Dichloroethane	0.025	0.5
1,1-Dichloroethylene	0.07	0.7
Methyl ethyl ketone	20	200.0
Tetrachloroethylene	0.07	0.7
Trichloroethylene	0.05	0.5
Vinyl chloride	0.05	0.2

* If o-, m-, and p-cresol cannot be differentiated, the total cresol concentration is used.

(a) = acid extractable semivolatiles.

(b/n) = base neutral extractable semivolatiles.

Section 4
Sampling Procedures

The sampling procedures to be used in this site investigation will be consistent for the purpose of this project. The Field Sampling and Analysis Plan (FSAP) outlines all the sampling procedure information. Please refer to the following sections of the FSAP for the following information:

1. Summary of Sampling Activity	FSAP Sections 1, 2, 3
2. Sampling Network Design and Rationale	FSAP Sections 1, 2, 3
3. Sample Custody Procedure	
▪ Sample Identification System	FSAP Section 4
▪ Initiation of Field Custody Procedure	FSAP Section 4
▪ Field Activity Documentation/Logbook	FSAP Section 4
▪ Sample Shipment and Transfer of Custody	FSAP Section 4
4. Sample Containers, Sample Preservation, and Maximum Holding Time	FSAP Section 4
5. Sample Handling, Packaging, and Shipment	FSAP Section 4
6. Decontamination Procedures	
▪ Personnel and Equipment	FSAP Section 4
▪ Sample Bottles	FSAP Section 4
▪ Sampling Devices	FSAP Section 4
7. Sampling Equipment and Procedures	
▪ Subsurface Sampling Procedures	
– Sampling Devices	FSAP Section 4
– Sampling Procedures	FSAP section 4
8. QC Sample Procedures	FSAP Section 4
9. Sample Collection	FSAP Section 4
10. Field Duplicate Sample Collection	FSAP Section 4
11. Matrix Spike/Matrix Spike Duplicate Sample Collection	FSAP Section 4
12. Field Measurement/Screening	FSAP Section 4
13. Storage and Disposal of Investigative Derived Waste (IDW)	FSAP Section 4

Section 5
Custody Procedures

The chain-of-custody protocol is presented in three parts: 1) field chain-of-custody procedures; 2) laboratory custody procedures; and 3) final evidence file procedures. Final project files, including all originals of laboratory reports and purge files, are maintained under document control in a secure area at RMT. The document control for the relevant laboratory records is the responsibility of each laboratory.

Chain-of-custody documentation enables possession of a sample to be traced from sample collection through analysis and disposal. Chain-of-custody procedures also cover raw laboratory data. A sample or project file is considered under custody if:

- The item is in a person's possession;
- The item is in that person's view after being in his or her possession;
- The item was in that person's possession and then placed in a secured location; or
- The item is in a designated and identified secure area.

5.1 Field Chain-of-Custody Procedures

The sample packaging and shipment procedures summarized below will ensure that the samples will arrive at the laboratory with the chain-of-custody intact. The protocol for specific sample numbering and other sample designations is included in Subsection 4.1 of the FSAP.

5.1.1 Field Procedures

The following procedures will be practiced during all field activities:

- Recognize that the field sampler is personally responsible for the care and custody of the samples until they are transferred to the laboratory or properly dispatched. Keep the number of people handling the samples to a minimum to ensure proper field chain-of-custody.
- Label each bottle with the project number, the sample identifier, the sample type, the sampler's initials, and the date and time of sample collection.
- Complete sample labels for each sample using waterproof ink, unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample tag because the ink pen would not function in freezing weather.

- Recognize that the On-site Coordinator will review all field activities to determine whether proper custody procedures were followed during the fieldwork and will decide with the RMT. project manager if additional samples are required due to a lapse in custody.

5.1.2 Sample Packaging, Transfer of Custody, and Shipment Procedures

Field chain-of-custody forms must accompany all samples and sample shipping containers to document their transfer from the field to the laboratory. The procedures to be implemented are as follows:

- Complete chain-of-custody forms indicating sample identification, containers filled, sampling date, sampling time, sample collector's name, and sample preservation, if applicable. Also note this information in the field notebooks maintained on the site.
- Repack shipping containers with samples, chain-of-custody forms, and water ice. Assign a chain-of-custody form to each set of sample containers to be shipped.
- Completed chain-of-custody forms will be placed in a plastic bag, sealed, and taped to the inside cover of the shipping container. After the samples are iced, the coolers will be sealed with strapping tape, dated, and shipped to the appropriate laboratory using an overnight delivery service. Identify common carriers or intermediate individuals on the chain-of-custody form, and retain copies of all bills-of-lading. Once the samples are received in the laboratory they are handled and processed in accordance with the laboratory SOPs, or as defined in this QAPP.
- The laboratories receiving the samples will check shipping containers for broken seals or damaged sample containers and for sample preservation as specified by the analytical method. The laboratories' sample management staff notes any problems, and log samples into the laboratory, and completes the chain-of-custody form. The person relinquishing the samples to the facility or agency should request the representative's signature acknowledging sample receipt. If the representative is unavailable or refuses, note this in the "Received By" space.
- Include copies of the chain-of-custody form with the analytical data.
- Return unused sample containers to the laboratory with the chain-of-custody forms.

A separate sample receipt is prepared whenever samples are split with a government agency. The receipt is marked to indicate with whom the samples are being split. The person relinquishing the samples to the agency should request the agency representative's signature acknowledging sample receipt. If the representative is unavailable or refuses, this is noted on the receipt and in the field notebook.

A copy of the chain-of-custody will accompany the samples to the laboratory. The field sampling personnel will retain one copy with the field notes. If a chain-of-custody form is damaged in shipment, the field copy will be made available. A written statement will

be prepared by the person who collected the samples listing the samples that were recorded on the damaged form and describing when and how the samples were collected. The statement should include information such as field notebook entries regarding the sample. This statement is submitted to the On-site Coordinator and RMT Project Manager for further action, as necessary.

An example sample chain-of-custody form from STL Laboratories, Inc. is included in Attachment C along with copies of chain-of-custody forms. Sample labels and custody seals are also included in Attachment C.

The chain-of-custody forms should be legibly completed. Errors will be corrected by drawing a single line through the incorrect information and entering the correct information. All corrections are to be initialed and dated by the person making the correction. This procedure applies to words or figures inserted or added to a previously recorded statement.

The following information is included on the Sample Chain-of-Custody Form (Attachment C).

- Project name, project number, and sampler information
- "The Sample Description" portion of the form must be completed for each sample. This information includes the Sample ID, sample date and time, sample depth. The sampling time **MUST** also be noted on the sample bottle (except for blind field duplicates where date and time would not be noted on bottle label or Chain-of-Custody Form).
- The sample matrix, preservative/filtration, number of containers, and requested analysis must be designated by checking the appropriate box and/or writing in the required information.

Sample custody is documented on the lower portion of the form, and includes the sampler's signature, signatures of persons involved in the possession of the sample with inclusive dates and times, and the date the sample was received at the laboratory as follows:

Relinquished by/Received by - This part of the form is a record of the individuals who actually had the samples in their custody. The spaces must be used in chronological order as the Chain-of-Custody Form is transferred with the samples.

(1) Sampler signs when relinquishing custody.
(2) Person accepting custody of samples from sampler signs.
(3) Person in (2) must sign when relinquishing custody.
(4)-(6) These are completed as necessary in the same manner as above.

Sampler - The person/persons collecting the samples must sign their name and print their name under their signature, and record the date and time the sampler relinquishes the samples to either the laboratory or shipper. The final signature is that of the person receiving the samples at the laboratory.

Additional Analyses/Remarks - Sampler may provide additional information about a sample (*e.g.*, if an odor is present, high or low pH, etc.). It can include any known or suspected hazard associated with the samples. Sample entry may add information to this section based on the laboratory project manager or supervisor communication to the laboratory after samples are received. Laboratory team leaders will use any hazard information to update and advise their analysts before work is started.

Note: If commercial carriers are used, the name of the carrier, any airbill number, and the date and time of relinquishing is written in by sample entry or field personnel and the airbill is attached to the Chain-of-Custody Form.

A copy of the chain-of-custody form should be returned with the sample results. The laboratory service request number/and or Case ID should be written on the chain-of-custody form to facilitate its use during project data entry.

5.2 Laboratory Chain-of-Custody Procedures

The laboratory assigns a unique, sequentially numbered, sample code to each sample received by the laboratory. Laboratory custody procedures for sample receiving and log-in, sample storage, and tracking for all laboratories are described in Attachment C. These custody procedures and holding time requirements for samples are described in the appropriate documents. Other subcontracting laboratories are responsible for their own chain-of-custody procedures.

5.3 Final Evidence File Custody Procedures

RMT, through its internal Records Management Program, provides systematic control of all records from their creation or receipt to their destruction. Following policies presented in RMT's Records Management Policy Manual, evidence files are created and maintained for investigative activities, including all relevant records (*e.g.*, laboratory reports, logs, raw field data, field notebooks, photographs, subcontractor reports, and data reviews). Files are held in a secured, controlled-access area and are under the custody of the Records Management Manager. The RMT project manager and principal-in-charge will have access to the files.

RMT Records Management maintains a file of raw analytical data and QA/QC documentation. This file includes, but is not limited to, maps and drawings, photographs, and field notes.

Analytical laboratories maintain a file for pertinent project information, including sample field chain-of-custody forms, other custody documents (air bills, etc.), work orders, Sample Receipt Acknowledgment Forms, if any, instrument detection limit and control limit tabulations, all raw analytical data on bench sheets, laboratory data, and project communication records.

Raw organic data system printouts will include date of analysis, analyst's name, parameters determined, calibration curve, calibration verifications, method blanks, sample number and dilutions performed, sample duplicates, spikes, and control samples. Internal laboratory QC sample results will be indicated on the analytical bench sheets and will include sample spikes, sample duplicates, initial and continuous calibration verification of standards and blanks, standard procedural blanks, and laboratory control samples.

Completed Final Evidence Files will be held as discrete RMT project records and will be available only upon request by authorized USEPA personnel. Files will be maintained in accordance with RMT's Records Management Policy. Files, including all pertinent QA and non-QA files, will be maintained for at least 10 years after USEPA provides written notice that all phases of the work (including O&M) have been completed and that all performance standards have been attained. The file will be offered to USEPA Region 5 prior to disposal.

Section 6
Calibration Procedures and Frequency

This section describes procedures for determining the working concentration ranges for specific analytes and for maintaining the accuracy of all of the instruments and measuring equipment that are used for conducting field tests and laboratory analyses. These instruments and equipment will be calibrated prior to each use or on a scheduled, periodic basis.

6.1 Field Instrument Calibration

Field instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications.

Equipment to be used during the field sampling will be examined to confirm that it is in good operating condition. This includes checking the manufacturer's operating manual and the instructions for each instrument to ensure that maintenance requirements are being observed. Field notes from previous sampling trips will be reviewed so that notations on prior equipment problems are not overlooked, and that necessary repairs to equipment have been carried out.

Currently no field analysis is proposed.

6.2 Laboratory Instrument Calibration

The calibration procedures and frequencies specified in the CLP organic SOWs and Laboratory SOPs will be implemented.

Calibration is required to demonstrate that the instruments used to perform quantitative chemical analysis are operating properly. Correct operation is important in meeting sensitivity requirements and in establishing detection limits. There are two types of calibration:
1) operational calibration, which is performed prior to instrument usage (*i.e.*, standard curves); or 2) periodic calibration, which is performed at prescribed intervals.

6.2.1 Calibration Program

All instruments and equipment that measure a quantity will be controlled by a formal calibration program. Development and implementation of the calibration program will be the responsibility of STL Laboratories, Inc.

Calibration Procedures

Recognized procedures (USEPA, ASTM, manufacturer's instructions) will be used when available. The CLP calibration procedures specified in the CLP organic SOWs and manufacturer's instructions will be implemented when available. Written calibration procedures will include the reference materials to be used, the calibration technique, the acceptable performance limits, and the frequency.

Equipment Identification

All equipment that is subject to calibration will be labeled with a unique number.

Calibration Frequency

The calibration frequencies specified in the referenced analytical methods will be followed.

Calibration Reference Standards

Physical standards (weights, certified thermometers) will be traceable to nationally recognized standards (*e.g.*, National Institute of Standards and Technology (NIST)).

Chemical reference standards will be NIST, Standard Reference Materials (SRMs), standards provided by the USEPA, or vendor-certified materials traceable to these standards.

Calibration Failure

Equipment that fails calibration will be removed from service or tagged to indicate that it is out of calibration. The equipment will be repaired and recalibrated before reuse. A record of all such occurrences will be maintained in the equipment calibration file.

Calibration Records

Calibration records will be maintained for all equipment that requires calibration. This information will include the instrument name and number, the calibration frequency and acceptance limits, the date of calibration, the calibration instructions, the name of the person performing the calibration, and

the records of any failures or repairs. Records for each instrument will be maintained with the raw data.

For instruments that are calibrated on an operational basis, calibration generally consists of determining instrument response against standards of known composition and concentration or the preparation of a standard response curve of the same compound at different concentrations. Records of these calibrations will be maintained in a record book kept by each team in their respective laboratories. This record book, prepared by the analyst, will contain the instrument name and number, the notice of calibration failure and repairs, and a brief record of all calibrations performed.

6.2.2 Operational Calibration

Operational calibration usually involves measuring a standard response or preparing a standard calibration curve. Operational calibration for the major pieces of equipment in the STL Laboratories is discussed below. The procedures used for each major piece of laboratory equipment are summarized in Table 6-1.

General Calibration Procedures

The analyst will eliminate, or minimize, the source of errors by proper selection of method, equipment, solvents, and gases. Since even the best quality materials may contain interfering substances, the analyst will analyze a method blank. The preparation of a standard curve may be necessary to certify the method.

Method Blank/Preparation Blank

The method blank will be prepared by following the procedure step-by-step, including the addition of all solvents and reagents in the quantities specified by the method. A method blank will be run with each group of 20 or fewer samples, or as specified in the referenced method.

Preparation of Standard Calibration Curve

Preparation of a standard calibration curve requires the preparation and analysis of standard solutions by mixing the species to be analyzed with the appropriate solvent used to introduce the species into the instrument. The

concentrations of the standard solutions will cover the working range of the instrument, and the sample measurements will be made within this range or the data will be qualified.

The calibration curve will be prepared by plotting instrument response versus concentration of the species analyzed so that sample concentrations can be determined.

6.2.3 GC/MS Calibration Procedures

The GC/MS mass calibration and abundance pattern, response factor stability, and internal response and retention time will be documented by the analyst.

Calibration of the HRGC/LRMS System for 2,3,7,8-TCDD

The analysis of 2,3,7,8-TCDD (2,3,7,8-tetrachlorodibenzo-p-dioxin) will be performed by high-resolution gas chromatography/low-resolution mass spectrometry (HRGC/LRMS) using Method 8280 (SW-846).

The calibration involves three separate procedures: mass calibration of the MS; establishment of GC retention time windows; and calibration of the target analytes.

Mass calibration is performed prior to analyzing the calibration standards, blanks, samples, and QC samples. Instrument tuning to maximum sensitivity is performed using FC-43.

Retention time windows are established prior to calibration of the standards using a window-defining solution mixture. To demonstrate resolution of close-eluting TCDDs, the GC column performance will be verified every 12 hours using a column performance solution mixture.

Initial calibration of the TCDD standards for the HRGC/LRMS at the beginning of each new sequence will consist of calibration using isotopically labeled 2,3,7,8-TCDD analog, native 2,3,7,8-TCDD compounds, and a labeled cleanup standard. The mean relative response factors, obtained by five-point initial calibration, will be used for all quantitations. Relative response factors for the native 2,3,7,8-TCDD relative to their labeled internal standards are calculated in accordance with the laboratory SOP. Compound identification and quantitation are based on the

compounds' GC retention times and ion abundance ratios of the m/z, minimum levels, signal-to-noise ratio, and mass assignment criteria. The established criteria for each compound must be met before any samples, blanks, or standards are analyzed.

Continuing calibration verification will be performed at the beginning of every 12-hour period using mid-level standards. Calibration verification consists of two parts: evaluation of the chromatographic resolution and verification of the response factor values to be used for quantification.

A second high-resolution GC column will be used to confirm detections of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). Confirmation analysis will be performed using a five-point calibration curve. Calibration procedures for the 2,3,7,8-TCDD compound are specified in the STL's Laboratory SOP for EPA Method 8280.

6.2.4 GC Calibration Procedure

The analyses of organichlorine pesticides/PCBs will be performed by gas chromatograph (GC) with an electron capture (ECD) detector in accordance with the CLP protocol. Initial calibration will be performed by the external standard method using a stock solution containing each parameter of interest. Table 6-1 summarizes these requirements.

Table 6-1
Summary of Laboratory Operational Calibration Requirements

INSTRUMENT	CALIBRATION STANDARDS USED, INITIAL & DAILY MINIMUM	ACCEPTANCE LIMITS	CORRECTIVE ACTIONS	REFERENCE
Gas chromatograph	Initial: A minimum of 3-point for pesticide Mix A and B Continuing: single point every 10 samples.	% RSD < 20% ± 25% of initial	Make new standards or establish new calibration curve	1
HRGC/LRMS	Initial: 5 levels Daily: 1 level	% RSD for RF ≤ 30% %D ≤ 30% of initial curve	Make new standard or establish new calibration curve	2

References:

1. USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration OLMO3.1.
2. USEPA. 1996. Test methods for evaluating solid waste, physical/chemical methods. SW-846, 3rd Edition.

Notes:

(1) Calibration standards made fresh daily.

Section 7
Analytical Procedures

All samples not subjected to field analyses will be analyzed for chemical parameters by STL Laboratories, Inc. in North Canton, Ohio and West Sacramento, California.

7.1 Field Analytical Procedures

To ensure that the analytical data gathered in the field are both valid and unbiased, the following steps will be taken:

- Field samplers will be trained in the use of each piece of equipment.
- Operating manuals will accompany each piece of equipment in the field.
- Preventive maintenance programs will be carried out on a scheduled basis.
- Spare components will be taken into the field in case of equipment failure or damage.
- Instruments will be calibrated on a daily basis and rechecked as specified in the FSAP.
- Readings and calibrations will be documented.
- QC checks of field notes will be performed.

At this time no field analytical procedures are proposed.

7.2 Laboratory Analytical Procedures

7.2.1 CLP Procedures

Methods published by the USEPA will be used as the basis for chlorinated pesticides. The laboratory will follow analytical method CLP SOW OLM03.1, USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration; Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846. Laboratory-specific operating procedures are provided in Attachment A to the QAPP. Methods are provided in Table 7-1.

Data validation and reporting procedures are discussed in Section 9.3 of this QAPP.

Table 7-1
Analysis Methods for the Constituents in the Soil and for TCLP Testing of the Excavated Soil and Investigative-derived Waste

ANALYTE	METHOD NUMBER	SOURCE/CITATION
Pesticides	CLP SOW OLMO3.1	1
2,3,7,8-TCDD	SW-846 - 8280	SOP, SW-846
High Resolution Dioxins	SW-846 - 8280	SOP, SW-846
Metals	SW-846 - 1311/6010B	SOP, SW-846
VOCs	SW-846 - 1311/8260B	SOP, SW-846
SVOCs	SW-846 - 1311/8270B	SOP, SW-846
Herbicides	SW-846 - 1311/8151A	SOP, SW-846
Pesticides	SW-846 - 1311/8081A	SOP, SW-846

1) CLP SOW OLM03.1, USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration.

SW-846 Test methods for evaluating solid waste, physical/chemical methods. USEPA, 1996.

Section 8
Internal Quality Control Checks

8.1 Field Quality Control Checks

QC procedures for soil samples will include calibrating the instruments as described in Section 6 of the QAPP, measuring duplicate samples and checking the reproducibility of the measurements by taking multiple readings on a single sample or reference standard. The QC information for field equipment is stated in Sections 3 and 12 of this QAPP. Assessment of field sampling precision and bias will be made by collecting field duplicate and MS/MSD samples for laboratory analysis. Collection of the samples will be in accordance with the applicable procedures in Section 4 of the Field Sampling and Analysis Plan (FSAP) at the frequency indicated.

8.2 Laboratory Quality Control Checks

The laboratory identified in Section 7 of this QAPP has a QC program that it uses to ensure the reliability and validity of the analyses performed at the laboratory. All analytical procedures are documented in writing as SOPs and each SOP includes a QC section that addresses the minimum QC requirements for the procedure. The internal quality control checks might differ slightly for each individual procedure but in general the QC requirements include the following:

- Procedural blanks (applicable to inorganic analysis)
- Instrument blanks
- Matrix spikes/matrix spike duplicates
- Surrogate spikes
- Analytical spikes (Graphite furnace)
- Laboratory duplicates
- Laboratory control samples
- Calibration standards
- Internal standards for HRGC/LRMS analysis
- Mass tuning for HRGC/LRMS analysis
- Standard reference materials
- Mass tuning for GC/MS analysis

- Second, dissimilar column confirmation for gas chromatographic analyses
- Control charts
- Proficiency testing of analytes

For a description of the specific QC requirements of this site investigation and the frequency of audit, refer to the submitted SOPs (Attachment A). The QC criteria are also included in the SOPs.

All data obtained will be properly recorded. The data package will include a full deliverable package allowing the recipient to reconstruct QC information and compare it to QC criteria. Any samples analyzed in nonconformance with the QC criteria will be reanalyzed by the laboratory, if it is deemed necessary. It is expected that sufficient volumes/weights of samples will be collected to allow for reanalysis when necessary. The quality control acceptance criteria and spike concentrations are specified in the analytical methods.

SECTION 9

Section 9
Data Reduction, Validation, and Reporting

All data generated through field activities, or by the laboratory operation shall be reduced, and validated prior to reporting. No data shall be disseminated by the laboratory until it has been subjected to these procedures which are summarized in subsections below.

9.1 Data Reduction

9.1.1 Field Data Reduction Procedures

Field data reduction procedures will be minimal in scope compared to those implemented in the laboratory setting. Only direct read instrumentation will be employed in the field. Such data will be written into field log books or forms immediately after measurements are taken. If errors are made, results will be legibly crossed out, initialed and dated by the field member, and corrected in a space adjacent to the original (erroneous) entry. Later, when the results forms required for this study are being filled out, the RMT On-site Coordinator, identified in Section 2 of this QAPP, will proof the forms to determine whether any transcription errors have been made by the field crew.

Because the use of additional field instrumentation may used at a later, there will be no further need for assuring that field data has been reduced properly through the use of formulas or interpretation of raw data printouts. Later, this QAPP will be modified to incorporate the use of any additional field instrumentation and any associated field data reduction procedures that may be relevant.

9.1.2 Laboratory Data Reduction Procedures

STL will perform in-house analytical data reduction under the direction of the Laboratory QA Manager. The Laboratory QA Manager will be responsible for assessing data quality and advising of any data that were rated "preliminary" or "unacceptable" or of other notations that would caution the data user of possible unreliability. Data reduction, by the laboratory, will be conducted as follows:

- The analysts who produced the laboratory data will first conduct a systematic review (Level 1 Review).

- An experienced peer, supervisor, or designee will examine the data to ensure that Level 1 review has been completed correctly and thoroughly (Level 2 Review). Following the Level 2 review, the data will be turned over to the Project Manager for a third-level review.
- The Project Manager will review the data for completeness and attainment of quality control criteria as outlined in the CLP protocols and/or established USEPA methods and for overall reasonableness.
- The Project Manager verifies the accuracy and completeness of the final reports.
- The Laboratory QA Manager and the Supervisor of the pertinent analytical section in conjunction with the RMT QA/QC Manager will decide whether any sample reanalysis is required.
- The data produced by CLP SOW OLM03.1 will follow the procedures specified in the analytical method.

Data reduction procedures for non-CLP methods are included in the associated Laboratory SOPs.

For this project, the equations that will be employed in reducing data are those specified in the OCLP OLM03.1 as described in USEPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration for pesticides in soil; Laboratory SOPs; and Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846 3rd edition for 2,3,7,8-TCDD/TCDF.

9.2 Data Reporting

Data reporting procedures shall be carried out for field and laboratory operations as indicated below:

9.2.1 Field Data Reporting

Field data reporting shall be conducted principally through the transmission of report sheets containing tabulated results of all measurements made in the field, and documentation of all field calibration activities.

9.2.2 Laboratory Data Reporting

The analytical laboratories will prepare and retain full analytical and QC documentation as required by the Contract Laboratory Program. The laboratories will also retain full documentation for the non-CLP parameter data. Such retained documentation need not

be hard (paper) copy, but may be in other storage media (*e.g.*, computer diskette or compact disc). As needed, the STL Laboratory will supply a hard copy of the retained information.

The laboratories will provide the following information in each analytical data package submitted:

1. Chain-of-custody record
2. Case Narrative:
   - Date of issuance
   - Cover sheet listing the samples included in the report
   - Laboratory analyses performed
   - Any deviations from intended analytical strategy
   - Laboratory batch number
   - Numbers of samples and respective matrices
   - Quality control procedures utilized and also references to the acceptance criteria
   - Laboratory report contents
   - Project name and number
   - Condition of samples 'as-received'
   - Discussion of whether or not sample holding times were met
   - Discussion of technical problems or other observations which may have created analytical difficulties
   - Discussion of any laboratory quality control checks which failed to meet project criteria
   - Signature of the Laboratory QA Manager
3. Chemistry Data Package
   - Case narrative for each analyzed batch of samples
   - Summary page indicating dates of analyses for samples and laboratory quality control checks
   - Cross referencing of laboratory sample to project sample identification numbers
   - Data qualifiers to be used should be adequately described
   - Sample preparation, including sample clean-up information, and analyses for samples

- Sample results
- Raw data for sample results and laboratory quality control samples
- Results of (dated) initial and continuing calibration checks, and HRGC/LRMS tuning results
- Matrix spike and matrix spike duplicate recoveries, the results for laboratory control samples, method blanks
- Internal standard and clean-up standard results
- Sample dilutions and sample duplicates
- Raw data system printouts, including labeled (and dated) chromatograms/spectra of sample results and laboratory quality control checks

9.3 Data Validation

Data validation procedures shall be performed for both field and laboratory operations as described below.

9.3.1 Procedures Used to Evaluate Field Data

Procedures to evaluate field data for this project primarily include checking for transcription errors and review of field log books, on the part of field crew members. This task will be the responsibility of the RMT On-site Coordinator. The data reviewer will review field notes and field chain-of-custody forms to determine that procedures specified in the FSAP and QAPP have been followed.

9.3.2 Procedures to Validate Laboratory Data

RMT's personnel will conduct third party data validation. The RMT Analytical QA Manager or designated data reviewer will conduct a review of the data for compliance with the established QC criteria based on the spike, duplicate, and blank results provided by the laboratory. Data validation will determine whether the procedures specified in this QAPP were implemented, the data quality objectives (DQOs) specified in this QAPP were attained, the specified quantitation limits were achieved, and the sample holding times were met. An evaluation of data accuracy,

precision, sensitivity, and completeness, based on method-specific criteria, will be performed according to the following guidance documents:

- National Functional Guidelines for Organic Data Review - Pesticide Analysis, USEPA, February 1994.
- Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd edition. USEPA, 1996.

The review is based primarily on the information in the QC summaries consisting of blank results; duplicate results; spike results (MSs/MSDs, surrogates); laboratory control sample results; internal standard results; and clean-up standard results. Raw data, including chromatograms, quantitation reports, data system printouts, and mass spectra for samples, standards, blanks, and laboratory spikes/laboratory duplicates or MS/MSDs will be reviewed as necessary.

The procedures used to evaluate data may include the following items:

- Technical holding times will be checked.
- Initial and continuing calibration results.
- Data for blanks, surrogate spikes, matrix spikes/matrix spike duplicates, laboratory control samples, clean-up standards, internal and external standards, and compound identification and quantitation.
- Internal standard areas and retention times (RT).
- Field precision will be determined from blind field duplicate data.
- Completeness of the data package will be checked to determine that all samples and analyses required by the Phase I RA Workplan and QAPP were processed, that the procedures specified in the QAPP were implemented, and that all deliverables specified in the QAPP are included.
- The Data Reviewer will identify any out-of-control data points and data omissions and will interact with the laboratory to correct data deficiencies.
- Decisions to repeat sample collection and analyses may be made by the RMT Project Manager based on the extent of the deficiencies and their importance in the overall context of the project.
- Data generated for the Riverdale Site Phase I RA will be computerized in a format organized to facilitate data review and evaluation. The computerized data set will include the data flags provided by the analytical laboratories, as well as additional flags and comments of the third party data validator.

- The third party data reviewer will assess the usability of results against the data quality objectives (DQOs).
- The data validation report will address the following items:
  - Overall quality and usability of the data
  - Evaluation of QC data, including precision, accuracy, and completeness of the data
  - Potential sample contamination due to blank contributions
  - Assessment of laboratory and field records
  - Actions regarding specific QC criteria exceedences

Section 10
Performance and System Audits

Performance and system audits of both field and laboratory activities will be conducted to verify that sampling and analysis are performed in accordance with the procedures established in the FSAP and QAPP. The audits of field and laboratory activities include two independent parts: internal and external audits.

10.1 Field Performance and System Audits

10.1.1 Internal Field Audits

Internal Field Audit Responsibilities

Internal audits of field activities including sampling and field measurements will be conducted by the On-site Coordinator.

Internal Field Audit Frequency

These audits will verify that all established procedures are being followed. Internal field audits will be conducted at least once at the beginning of the site sample collection activities.

Internal Field Audit Procedures

The audits will include examination of field sampling records, field instrument operating records, sample collection, handling and packaging in compliance with the established procedures, maintenance of QA procedures, chain-of-custody, etc. Follow-up audits will be conducted to correct deficiencies, and to verify that QA procedures are maintained throughout the field activities. The audits will involve review of field measurement records, instrumentation calibration records, and sample documentation.

10.1.2 External Field Audits

External Field Audit Responsibilities

External field audits may be conducted by the USEPA Region 5.

External Field Audit Frequency

External field audits may be conducted any time during the field operations. These audits may or may not be announced and are at the discretion of the USEPA Region 5.

Overview of the External Field Audit Process

External field audits will be conducted according to the field activity information presented in the QAPP.

10.2 Laboratory Performance and Systems Audits

10.2.1 Internal Laboratory Audits

Internal Laboratory Audit Responsibilities

The internal laboratory audit will be conducted by the Laboratory QA Manager. STL's Corporate Director of Quality Assurance directs the annual systems audit of the laboratory.

Internal Laboratory Audit Frequency

The internal laboratory system audits will be done on an annual basis while the internal lab performance audits will be conducted on a quarterly basis.

Internal Laboratory Audit Procedures

Audit procedures for the CLP RAS are specified in the current RAS SOWs for organic and inorganic constituents. The system audits include the examination of laboratory documentation on sample receiving, sample log-in, sample storage, chain-of-custody procedures, sample preparation and analysis, instrument operating records, etc. The performance audits consist of random data reviews, continuous trend analysis of laboratory QA data, and periodic analysis of performance evaluation samples. Systems audits are performed to verify the continuity of personnel, instrumentation, and quality control requirements contained in the SOW. STL Quality SOP No. CORP-QA-0014 contains information regarding the Laboratory QA/AC audit procedures. The QA Manager conducts the evaluation in accordance with an audit outline to assess the laboratory's adherence to the requirements specified in the laboratory QA Manual, SOPs, internal policies, and to assess the status of corrective actions. The QA Manager prepares a summary audit report for the

- submittal and review by the Corporate QA Director. The report is maintained according to STL's record keeping procedures. Operations management is responsible for taking corrective action to address the findings and areas needing improvement identified during the audit.

10.2.2 External Laboratory Audits

External Laboratory Audit Responsibilities

An external audit may be conducted by USEPA Region 5.

External Laboratory Audit Frequency

An external laboratory audit may be conducted at least once prior to the initiation of the sampling and analysis activities. These audits may or may not be announced and are at the discretion of the USEPA.

Overview of the External Laboratory Audit Process

External laboratory audits will include (but not be limited to) review of laboratory analytical procedures, laboratory on-site audits, and/or submission of performance evaluation samples to the laboratory for analysis.

SECTION 11

Section 11
Preventative Maintenance

11.1 Field Instrument Preventative Maintenance

The field equipment for this project includes surveying equipment. Specific preventative maintenance procedures to be followed for field equipment are those recommended by the manufacturer. Field instruments will be checked and calibrated daily before use and every 4 hours during use. Calibration checks will be documented on the Field Meter/Calibration Log sheets. Backup instruments and equipment will be available on-site or within 1 day shipment to avoid delays in the field schedule.

11.2 Laboratory Instrument Preventative Maintenance

As part of their QA/QC Program, a routine preventative maintenance program is conducted by STL Laboratories, Inc. to minimize the occurrence of instrument failure and other system malfunctions. Each team at STL performs routine scheduled maintenance and repair, or coordinates with the vendor for the repair of all instruments. All laboratory instruments are maintained in accordance with manufacturer's specifications or the requirements for the specific instrument. This maintenance is carried out on a regular, scheduled basis, and is documented in the laboratory instrument maintenance logbook for each instrument. The documentation includes the following information:

- Instrument make, model, serial number, installation date with demonstration of performance following installation
- Preventive maintenance
- Troubleshooting and corrective maintenance
- Appropriate external service agreement documents
- Reference to outside vendor service documents by number and date
- Instrument/equipment major spare parts list or inventory
- Instrument-specific preventive maintenance logbook or file for each functional unit

Emergency repair or scheduled manufacture's maintenance is provided under a repair and maintenance contract with factory representatives.

Instruments used for CLP tests will follow the preventive maintenance procedures outlined in the CLP SOW. The non-CLP test instruments will follow the preventive maintenance procedures listed in the SOPs for the analytical methods provided in Attachment A. All

maintenance activities must be documented in the record books to provide a history of maintenance records. The maintenance records shall include the following items as a minimum:

- Name and serial number of the item or equipment
- Details of maintenance performed
- Dates and results of recalibrations/reverifications indicating back to control
- Analysts initials and the date maintenance was performed whether by the analyst or a contracted service representative

Instruments and equipment that do not function adequately are tagged not to be used until repaired or recalibrated.

Section 12
Specific Routine Procedures Used to Assess Data Precision, Accuracy, and Completeness

12.1 Field Measurements

Field data will be assessed by the RMT On-site Coordinator. The RMT On-site Coordinator will review the field results for compliance with the established QC criteria that are specified in the QAPP and FSAP. Accuracy of the field measurements will be assessed using daily instrument calibration and calibration checks. Precision will be assessed on the basis of reproducibility by multiple instrument readings as measurements are taken.

Data completeness for field data will be calculated using Equation 12-1:

$$Completeness = \frac{Valid\ Data\ Obtained}{Total\ Data\ Planned} X\ 100 \qquad Equ.\ 12-1$$

12.2 Laboratory Data

Laboratory results will be assessed for compliance with required precision, accuracy, completeness, and sensitivity. The procedures used to assess data precision and accuracy will include a review of the laboratories' QC data, and the results of the MS/MSDs, and the duplicates using the procedures outlined in USEPA guidance documents (USEPA, 1987, 1993, 1994a, 1994b, 1994c, 1996, and 1997). The completeness of the sampling plan will be assessed against the data quality objectives of the QAPP after the analytical results have been received.

12.2.1 Precision

Precision of laboratory analyses will be assessed by comparing the analytical results between matrix spikes/matrix spike duplicates (MS/MSDs) for organic analysis. The relative percent difference (%RPD) will be calculated for each pair of duplicate analyses using the Equation 12-2.

$$\%RPD = \frac{S - D}{(S + D)/2} X\ 100 \qquad Equ.\ 12-2$$

Where:

S = First sample value (original or MS value)
D = Second sample value (duplicate or MSD value)

12.2.2 Accuracy

Accuracy of laboratory results will be assessed for compliance with the established QC criteria using the analytical results of method blanks, reagent/preparation blanks, and matrix spike/matrix spike duplicate samples. The percent recovery (%R) of matrix spike samples will be calculated using Equation 12-3.

$$\%R = \frac{A - B}{C} X\ 100 \qquad Equ.12-3$$

Where:

A = the analyte concentration determined experimentally from the spiked sample
B = the background level determined by a separate analysis of the unspiked sample
C = the amount of the spike added

12.2.3 Completeness

The data completeness of laboratory analysis results will be assessed for compliance with the amount of data required for decision making. The completeness is calculated using Equation 12-1.

12.2.4 Sensitivity

The achievement of method detection limits depends on instrumental sensitivity and matrix effects. Therefore, it is important to monitor the instrumental sensitivity to ensure the data quality through constant instrument performance. The instrument sensitivity will be monitored through the analysis of a method blank, a calibration check sample, and laboratory control samples, etc.

Section 13
Corrective Action

Corrective action is the process of identifying, recommending, approving and implementing measures to counter unacceptable procedures or out-of-quality control performance which can affect data quality. Corrective action can occur during field activities, laboratory analyses, data validation and data assessment. All corrective action proposed and implemented will be documented in the regular quality assurance reports to management. Corrective action should only be implemented after approval by the Project Manager, or his designee, the On-site Coordinator. If immediate corrective action is required, approvals secured by telephone from the Project Manager should be documented in an additional memorandum.

For noncompliance problems, a formal corrective action program will be determined and implemented at the time the problem is identified. The person who identifies the problem will be responsible for notifying the Project Manager, who in turn will notify the USEPA Remedial Project Manager. The laboratories will communicate analytical problems to the RMT Project Manager. Implementation of corrective action will be confirmed in writing through the same personnel.

Any nonconformance with the established quality control procedures in the QAPP or Field Sampling and Analysis Plan will be identified and corrected in accordance with the QAPP. The USEPA Remedial Project Manager, or his designee, will issue a nonconformance report for each nonconformance condition.

Corrective actions will be implemented and documented in the field record book. No staff member will initiate corrective action without prior communication of findings through the proper channels. If corrective actions are insufficient, work may be stopped by stop-work order by the RPM or the Phase I RA Coordinator.

13.1 Field Corrective Action

Corrective action in the field can be needed when the sample network is changed (*i.e.*, more/less samples, sampling locations other than those specified in the QAPP, etc.), sampling procedures and/or field analytical procedures require modification, etc. due to unexpected conditions. Technical staff and project personnel will be responsible for reporting all suspected technical or QA nonconformances or suspected deficiencies of any activity or issued document by reporting the situation to the RMT On-site Coordinator or designee. This person will assess the suspected problems in consultation with the Project QA Manager on making a decision

based on the potential for the situation to impact the quality of the data. If it is determined that the situation warrants a reportable nonconformance requiring corrective action, then the RMT On-site Coordinator will complete a nonconformance report.

The On-site Coordinator will be responsible for ensuring that corrective action for nonconformances are initiated by:

- Evaluating all reported nonconformances;
- Controlling additional work on nonconforming items;
- Determining disposition or action to be taken;
- Maintaining a log of nonconformances;
- Reviewing nonconformance reports and corrective actions taken; and
- Ensuring nonconformance reports are included in the final site documentation in project files.

If appropriate, the RMT On-site Coordinator will ensure that no additional work that is dependent on the nonconforming activity is performed until the corrective actions are completed.

Corrective action for field measurements may include:

- Repeat the measurement to check the error;
- Check for all proper adjustments for ambient conditions such as temperature;
- Check the batteries;
- Recalibrate;
- Check the calibration;
- Replace the instrument or measurement devices;
- Stop work (if necessary).

The RMT On-site Coordinator or his designee is responsible for all site activities. In this role, the OSC may be required to adjust the site programs to accommodate site specific needs. When it becomes necessary to modify a program, the responsible person notifies the QA Manager of the anticipated change and implements the necessary changes after obtaining the approval of the RMT Project Manager and the USEPA Remedial Project Manager. The change in the program will be documented on the field change request (FCR) that will be signed by the initiators and the RMT On-site Coordinator. The FCR for each document will be numbered serially as required. The FCR shall be attached to the file copy of the affected document. The On-site Coordinator must approve the change in writing or verbally prior to field implementation, if feasible. If unacceptable, the action taken during the period of deviation will

be evaluated in order to determine the significance of any departure from established program practices and action taken.

The RMT On-site Coordinator for the Riverdale Site is responsible for the controlling, tracking, and implementation of the identified changes. Reports on all changes will be distributed to all affected parties, as determined by the RMT Project Manager. The RPM will be notified whenever program changes in the field are made.

Corrective action resulting from internal field audits will be implemented immediately if data may be adversely affected due to unapproved or improper use of approved methods. The On-site Coordinator will identify deficiencies and recommended corrective action to the Project Manager. Implementation of corrective actions will be performed by the On-site Coordinator and field team. Corrective action will be documented in quality assurance reports to the entire project management.

13.2 Laboratory Corrective Action

Corrective actions are required whenever an out-of-control event or potential out-of-control event is noted. Corrective actions are taken to rectify conditions adverse to quality, and where possible, to prevent their reoccurrence. Corrective actions should be timely, determine the root cause, and evaluate any propagation of the error or problem. The investigative action taken is somewhat dependent on the analysis and the event. Corrective action in the laboratory may occur prior to, during, or after the initial analysis.

A number of conditions such as broken sample containers, multiple phases, low/high pH readings, potentially high concentration samples may be identified during sample log-in or just prior to analysis. The corrective action program is under the supervision of the Laboratory QA Manager. Following consultation with lab analysts and section leaders, it may be necessary for the Laboratory Manager to approve the implementation of corrective action. The submitted standard operating procedures (SOPs) specify some conditions during or after analysis that may automatically trigger corrective action or optional procedures. These conditions may include dilution of samples, additional sample extract cleanup, automatic reinjection/reanalysis when certain quality control criteria are not met, etc. Each laboratory implements its own corrective action program.

Corrective actions are required whenever an out-of-control event or potential out-of-control event is noted. The investigative action taken is somewhat dependent on the analysis and the event.

Corrective actions may be necessary if the following occur:

- QC data are outside the warning or acceptable windows for precision and accuracy;
- Blanks contain target analytes above acceptable levels;
- Undesirable trends are detected in spike recoveries or RPD between duplicates;
- There are unusual changes in detection limits;
- Deficiencies are detected by the QA Department during internal or external audits or from the results of performance evaluation samples; or
- Inquiries concerning data quality are received.

Depending on the problem, the corrective action employed may be formal or informal. On-the-spot actions are used to correct minor problems, such as recalibration, retuning, or a minor repair (*e.g.*, replacement of a minor part) of a malfunctioning instrument or the correction of poor analytical technique being used. Corrective action procedures are often handled at the bench level by the analyst, who reviews the preparation or extraction procedure for possible errors, checks the instrument calibration, spike and calibration mixes, instrument sensitivity, and so on. If the problem persists or cannot be identified, the matter is referred to the laboratory team leader, and/or QA Manager for further investigation. Corrective action steps may include identification of immediate actions (quick fixes); identification of root causes and appropriate corrective actions to preclude recurrence; and feedback to the staff on non-conformance occurrence and corrective actions. Once resolved, full documentation of the corrective action procedure is filed in the laboratory project file.

These corrective actions are performed prior to release of the data from the laboratory. The corrective actions will be documented in both the laboratory's corrective action log (signed by analyst, section leader and quality control coordinator), and the narrative data report sent from the laboratory to the RMT data validator. If corrective action dos not rectify the situation, the laboratory will contact the RMT Project Manager.

The Contract Laboratory Analytical Support Services (CLASS) or RMT data validator also may request corrective action for any contractual nonconformance identified by audits or data validation. RMT data validator or the USEPA Central Regional Laboratory (CRL) may request corrective action by the laboratory for any nonconformances identified in the data validation process or through the CLASS, or for minor problems, the laboratory may be contacted directly. Corrective action may include the following:

- Reanalysis of samples, if holding time requirement permits;
- Resampling and analysis; and/or
- Evaluation and amendment of sampling procedures; and/or

- Evaluation and amendment of analytical procedures; and/or
- Accepting data and acknowledging the level of uncertainty.

13.3 Corrective Action During Data Validation and Data Assessment

Data reviewers may identify the need for corrective action during either the data validation or data assessment. Potential types of corrective action may include resampling by the field team or reinjection/reanalysis of samples by the laboratory.

These actions are dependent upon the ability to mobilize the field team, whether the data to be collected is necessary to meet the required quality assurance objectives (*e.g.*, the holding time for samples is not exceeded, etc.) When the RMT data reviewer identifies a corrective action situation, the Project Manager will be responsible for approving the implementation of corrective action, including resampling, during data assessment. All corrective actions of this type will be documented by the QA Manager. Final summary data tables will not be issued until all data have been validated and all corrective actions have been made.

Section 14
Quality Assurance Reports to Management

The deliverables associated with the tasks identified in the Workplan and monthly progress reports will contain separate QA sections in which data quality information collected during the task is summarized. Those reports will be the responsibility of the Project Manager and will include the Quality Assurance Manager report on the accuracy, precision, and completeness of the data; the results of the performance audits, if any; the results of system audits; any reported nonconformances; any significant QA/QC problems; and any corrective action needed or taken since the last report; and approved revisions to the QA/QC processes.

14.1 Contents of Project QA Reports

The QA reports will contain, on a routine basis, all results of field and laboratory audits, all information generated during the past month reflecting on the achievement of specific data quality objectives, and a summary of corrective action that was implemented, and its immediate results on the project. The status of the project with respect to the Project Schedule included in the QAPP will be determined. Whenever necessary, updates on training provided, changes in key personnel, anticipated problems in the field or lab for the coming month that could bear on data quality along with proposed solutions, will be reported. Detailed references to QAPP modifications will also be highlighted. All QA reports will be prepared in written, final format by the project manager or his designee.

In the event of an emergency, or in case it is essential to implement corrective action immediately, QA reports can be made by telephone to the appropriate individuals, as identified in the Project Organization or Corrective Action sections of this QAPP. However, these events and their resolution will be addressed thoroughly in the next issue of the monthly QA report.

14.2 Frequency of QA Reports

The QA Reports will be prepared on a monthly. The reports will continue until the project has been completed. The frequency of any emergency reports that must be delivered verbally cannot be estimated at the present time.

14.3 Individuals Receiving/Reviewing QA Reports

Copies of the monthly QA report will be forwarded to the:

- USEPA RPM
- Riverdale Coordinator
- RMT Task Leader

These individuals will be responsible for reviewing the report and getting input on the report from other individuals as needed.

Section 15
References

USEPA. 1987. A compendium of Superfund field operations methods. USEPA, Office of Emergency and Remedial Response, EPA/540/P-87/001.

USEPA. 1993. Data Quality Objectives Process for Superfund, Interim Final Guidance, OSWER Directive 9355.9-01. EPA 540/R-93/071. September 1993.

USEPA. 1994a. Guidance for the Data Quality Objectives Process EPA QA/G-4, September 1994.

USEPA. 1994b. USEPA contract laboratory program. National functional guidelines for organic data review. EPA-540/R-94/012. February 1994.

USEPA. 1994c. USEPA contract laboratory program statement of work for organics analysis. Multi-media, multi-concentration, OLM03.2 December 1994. EPA 540/R-96/073.

USEPA. 1996. Test methods for evaluating solid waste; physical/chemical methods. SW-846.

USEPA. 1997. EPA requirements for quality assurance project plans for environmental data operations. Document No. EPA QA/R-5, October 1997.

APPENDIX B

Integrated
Environmental
Solutions

222 South Riverside Plaza
Suite 820
Chicago, IL 60606
Telephone: 312-575-0200
Fax: 312-575-0300

APPENDIX B

FIELD SAMPLING AND ANALYSIS PLAN FOR THE PHASE 1 REMOVAL ACTION WORKPLAN

RIVERDALE CHEMICAL COMPANY
CHICAGO HEIGHTS, ILLINOIS

September 2000

PREPARED FOR
RIVERDALE CHEMICAL COMPANY

PREPARED BY
RMT, INC.

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List of Acronyms

AOC	Administrative Order of Consent
ASTM	American Society for Testing and Materials
ATSDR	Agency for Toxic Substances and Disease Registry
BNA	Base-neutral-acid extractables
CLP	Contract Laboratory Program
COC	Chain of Custody
COPC	Compound of Potential Concern
EE/CA	Engineering Evaluation/Cost Analysis
ESS	Environmental Sampling Supply
FIT	Field Investigation Team
FS	Feasibility Study
FSAP	Field Sampling and Analysis Plan
HSP	Health and Safety Plan
ID	Internal Diameter
IDW	Investigation-Derived Waste
IEPA	Illinois Environmental Protection Agency
IRM	Interim Remedial Measure
MS	Matrix Spike
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MSD	Matrix Spike Duplicate
OSC	On-Site Coordinator
oz.	Ounce
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RI/FS	Remedial Investigation/Feasibility Study
RMT	Residuals Management Technology, Inc.
SL	Sampling Location
STL	Severn Trent Laboratories, Inc.
TCLP	Toxicity Characteristic Leaching Procedure
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency

SECTION 1

Section 1
Introduction

1.1 Background

The Riverdale Chemical Company in Chicago Heights, Illinois, is an active facility used for the formulation and packaging of various agricultural and turf chemicals. Riverdale has been conducting an RI/FS under an AOC at the site since 1985.

In April 1984, a site study was conducted by the Field Investigation Team (FIT) as part of the National Dioxin Test Strategy Program. This study indicated the presence of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and pesticides in the surface soil at the site. Given the results of the FIT study, Riverdale completed an Interim Remedial Measure (IRM) to control exposure to contaminants under an AOC between the USEPA and Riverdale dated September 28, 1984. The IRM required placement of a geotextile fabric over an area of approximately 19,600 square feet along with a barrier layer of 8 to 10 inches of crushed limestone, which is regularly inspected and maintained.

Riverdale entered into a separate AOC on February 27, 1985, to conduct the RI/FS at the site. Field work was conducted by IT between October 1985 and November 1986. The Final RI Report was submitted to the USEPA in April 1988. Riverdale continues to maintain the crushed limestone barrier along with other requirements of the IRM AOC.

A fire occurred at the facility on July 2, 1992, when a lighting strike apparently triggered a fire at the warehouse (Building 4). The warehouse contained various fungicide, herbicide, and insecticide products, including the active ingredients 2,4, -D, Dicamba, 2, 4, -DP, MCPA, MCPP, and oxidizers. These products were stored in the brick construction warehouse on a concrete slab floor. It was estimated that the fire consumed 85 percent of the contents of the warehouse. After the fire was extinguished, the fire residue was contained within the shell of the warehouse, secured with plastic sheeting within a cyclone fence, and permitted for proper disposal. Water used to fight the fire was diverted, through emergency excavation procedures, to a low area north of the warehouse and to a drainage pond southeast of the warehouse. The water was sampled and contained 2, 4, -D up to 420 ppm; MCPA up to 70 ppm; 2, 4, DP up to 17 ppm; MCPP up to 14 ppm; fungicide up to 58 ppm; and dicamba up to 4.1 ppm. With the approval of the USEPA, the Illinois Environmental Protection Agency (IEPA), and the Thorn Creek Basin Sanitary District, the collected water was discharged to the sewer system for treatment.

In 1996, the Agency for Toxic Substances and Disease Registry (ATSDR) conducted a study of the surrounding residential areas at the request of the USEPA. On July 29, 1996, ATSDR issued a report summarizing soil sampling activities performed on May 2, 1996. The conclusion of the report stated that the concentrations of base neutral/acid extractables (BN/As) and organochlorine chemicals detected in the surface soil samples from residential properties adjacent to the site, do not pose a public health hazard. The report recommended no further activities as a result of the soil sampling.

The USEPA contacted Riverdale in December 1996 to discuss finalization of the RI Report. The USEPA provided minor comments to be included prior to approval. Riverdale incorporated the USEPA's comments; and, in addition, revised the RI Report to reflect current site conditions and current guidance. Based on the Public Health Evaluation (PHE), the complete human exposure pathways are the industrial worker exposure to surface soil and construction worker exposure to subsurface soil.

In 1998, Riverdale conducted additional limited investigations to provide the USEPA with geological data to support the conclusions of the RI Report. This information was presented in letter reports to the USEPA on March 24, 1998, and April 13, 1998, and was not incorporated into the RI Report or FS Work Plan. The supplemental information developed included a geologic characterization of the subsurface soil in the southern portion of the site which confirms low hydraulic conductivity (10^{-8} cm/s) of underlying soil based on a two foot core sample interval. Although at the time of the testign the horizontal extent of the low conductivity clay layer was not defined, recent soil boring and excavation actititivies at the site visually confirm the presence of the clay across the site.

Riverdale has completed a Feasibility Study (FS) Report, which was submitted to the USEPA for review and comment in February 2000. Instead of finalizing the FS Report, the USEPA has subsequently prepared an Engineering Evaluation/Cost Analysis (EE/CA) for the site.

The Riverdale facility is an active manufacturing operation with expansions and upgrades are necessary to meet regulatory requirements and business needs. Riverdale is currently undergoing three major construction projects including, a raw material storage warehouse (at the current raw material storage pad), a liquid storage facility (at the above ground tank farm), and a railroad unloading area (at the railroad siding located between Buildings No. 2 and No. 3) mandated by the Department of Agriculture requirements. The Phase I RA Workplan describes sampling and removal action activities that will be performed in the vicinity of the construction projects. It also described the ancillary soil sampling to be conducted at the proposed utility corridor, low lying area and the Building No. 3 expansion.

1.2 Purpose

The Phase I RA addresses the removal action proposed to address contaminated soil at three major areas of construction at the Riverdale Site. These construction areas are: 1) installation of upgraded secondary containment around the liquid storage area (liquid storage area); 2) expansion of the raw materials warehouse (raw materials warehouse); and 3) installation of a spill containment basin and 20,000 gallon storage area at the railroad unloading area (railroad unloading area). In addition, other areas will be evaluated including additional soil sampling at the utility area, the low lying area in the southeastern side of the site, and the southwest side of Building No. 3 (Hartwell Building expansion). The purpose of this Field Sampling and Analysis Plan (FSAP) is to present the procedures for the collection of soil samples for the tasks to be implemented during the Phase I RA.

Section 2
Objectives and Scope

2.1 Phase I Removal Action

The proposed remedy for the site includes excavation and disposal of soil (Phase I RA) and installation of an enhanced asphalt cap (Phase II RA). The Phase I RA includes the collection of additional data necessary to complete the removal action(s). The components of the Phase I RA include the following:

- Soil sampling within the footprints of the liquid storage area and raw materials warehouse
- Soil sampling in the area where utilities (utility area) are located at the northern end of the site
- Soil sampling in the low lying area located at the southeastern side of the site which the USEPA has described as wetlands
- Soil sampling at the southwest side of Building No. 3 for the Hartwell Building expansion (20 foot by 40 foot pre-engineered building)
- Excavation and off-site disposal of soils (with concentrations of compounds of potential concern (COPC) that exceed a total cancer risk above 1×10^{-4} and noncancer hazard index greater than one) under the liquid storage area, with vertical extent based on the construction requirement; and the horizontal extent defined by confirmatory sampling and the boundaries of the liquid storage area
- Excavation and off-site disposal of soils (with concentrations of COPCs that exceed a calculated total cancer risk of 1×10^{-4} and noncancer hazard index greater than one) under the raw materials warehouse, with the vertical extent limited to five feet below ground surface (bgs); and the horizontal extent defined by confirmatory sampling and the boundaries of the raw materials warehouse
- Excavation and off-site disposal of soils (with concentrations of COPCs that exceed a calculated total cancer risk above 1×10^{-4} and noncancer hazard index greater than one) under the railroad unloading area, with vertical extent limited to eight feet below ground surface and horizontal extent defined by the boundaries of the spill containment area and the 20,000 gallon storage area
- Installation of a utility corridor or excavation and off-site disposal of soils (with concentrations of COPCs that exceed a calculated total cancer risk of 1×10^{-4} and noncancer hazard index greater than one) at the utility area, if any, with the vertical extent based on the depth of utilities and the horizontal extent defined by confirmatory sampling adjacent to the buried utilities
- Characterization of excavated soils to determine off-site disposal requirements

In general, the soils will be sampled and analyzed for chemical analysis listed in Table 2-1, although not all samples will be analyzed for all of the parameters listed. A brief description of the scope for the soil sampling, confirmation sampling and disposal characterization is provided in the following sections.

2.2 Soil Sampling

The scope of work for the soil sampling includes:

- Soil sampling at within the footprints of the liquid storage area and raw materials warehouse
- Soil sampling at four locations in the area where utilities (utility area) are located at the northern end of the site
- Soil sampling at four locations in the low lying area located at the southeastern side of the site which the USEPA has described as a wetlands
- Soil sampling at the southwest side of Building No. 3 for the Hartwell Building expansion (20 foot by 40 foot pre-engineered building)

Several sampling techniques will be used to collect the soil samples dependent on site conditions including: the thickness of the limestone layer, absence of limestone layer (low lying area) and current access considerations (existing tanks). Sampling at the liquid storage area, raw materials area, Hartwell Building expansion, and utility corridor will consist of soil samples borings drilled (or push probe sampling) to a depth of four-feet below ground surface (bgs). Two samples will be collected from each location, at approximately one foot to two-feet bgs, which is directly below the crushed limestone layer (the first interval with recovery) and at four-feet bgs.

An alternative sampling technique will be used at the raw materials warehouse excavation area, which is identified based on previous sampling results. The area is covered by approximately two feet of crushed limestone which has been compacted over several years. A backhoe will be used to remove the crushed limestone layer prior to sample collection. A sample will be collected directly below the crushed limestone layer using stainless steel sampling spoons. Following sample collection, the backhoe will be used to remove an additional two feet of soil to reach a depth of four feet bgs. The second soil sample will be obtained.

Samples collected in the low lying area will be collected at three locations using push probe sampling technique with samples collected from two depths, 0 to 12 inches bgs and from approximately 2.5 feet to 3.5 feet bgs (top of clay) to confirm consistent stratigraphy. Samples will be collected from 0 to 6 inches bgs at three other locations to determine potential extent of impact.

Sample locations for the liquid storage area, and raw materials storage area are provided in Figure 3-1 and Figure 3-2, respectively. The locations proposed for the utility area, low lying area and Hartwell Building expansion are provided in Figure 3-3, 3-4 and 3-5, respectively. The locations may be modified in the field based on accessibility to the areas.

Samples will be analyzed for the six pesticide COPCs. At locations where dioxin has been detected previously, some samples will also be analyzed for dioxin. Soil samples collected from the liquid storage area, raw materials warehouse, and the low lying area located to the southeastern side of the site will be analyzed for the six pesticide COPC's. Several samples will be analyzed for dioxin (2,3,7,8 TCDD) in these areas to confirm the extent, if any, of COPC's with concentrations of COPCs that exceed a calculated total cancer risk above 1×10^{-4} and noncancer hazard index greater than one. Three samples will be analyzed for dioxin (2,3,7,8 TCDD) in the liquid storage area; one at the east side (Phase 1 liquid storage area construction), one in the middle (Phase 1 liquid storage area construction), and one at the west side (Phase 2 liquid storage area construction). Similarly, two samples will be analyzed for dioxin (2,3,7,8 TCDD) at the east and west side of the raw materials warehouse. In the low lying area at the southeast side of the site, samples will be analyzed for full TCL (VOCs 8260, SVOCs 8270, PCBs 8082, Pesticides 8081, Herbicides 8151 and high resolution dioxin, SW8290) and TAL (Metals 6010 and 7471) analysis. Two samples will be analyzed for high resolution dioxin, SW8290 analysis.

2.3 Confirmation Sampling

The scope of the confirmation sampling includes:

- Two to four soil samples will be collected from the base of the excavation, if any, at the liquid storage area. The locations of the samples will be based on vertical extent of the construction and horizontal sampling results.
- Four soil sample will be collected from the base of the excavation, if any, at the raw materials warehouse. The location of the sample will be based on the vertical extent of construction and horizontal sampling results.
- Five soil samples will be collected from base of the excavation, if any, at the railroad unloading area. Vertical and horizontal extent will be based on the construction requirements.
- One to five soil samples will be collected from base of the excavation, if any, at the utility area. The locations will be based on the depth of the utilities and the horizontal sampling results.

Discrete samples (grab) will be collected at the base of the excavations (4 feet bgs). Sample collection at the utility area will be proposed, if necessary, based on the results of the soil sampling described in the previous section. The samples will be analyzed for the six pesticide COPCs. Dioxin will be analyzed at some locations.

2.4 Disposal Characterization

The scope of the disposal characterization includes:

- Characterization of soils excavated (with concentrations of COPCs that exceed a total cancer risk above 1×10^{-4} and noncancer hazard index greater than one) from the liquid storage area, if any
- Characterization of soils excavated (with concentrations of COPCs that exceed a calculated total cancer risk of 1×10^{-4} and noncancer hazard index greater than one) at the raw materials warehouse, if any
- Characterization of soil excavated (with concentrations of COPCs that exceed a calculated total cancer risk above 1×10^{-4} and noncancer hazard index greater than one) at the railroad unloading area
- Characterization of soil excavated during the installation of a utility corridor (with concentrations of COPCs that exceed a calculated total cancer risk of 1×10^{-4} and noncancer hazard index greater than one) at the utility area, if any

The excavated soil will be stockpiled in separate areas at the site. Soil will be stockpiled on visquin liner. The soils will also covered with visquin on a daily basis to manage the excavated soils prior to disposal. Composite samples from six to eight locations on the pile will be collected from the stockpiles following excavation activities. The composite sample will be representative of the excavated soil. The volume of soil to be excavated from this area is not defined at this point, therefore, the exact number of samples to be collected cannot be determined, but at a minimum, one composite sample will be taken from each area of excavation.

Table 2-1
Soil Analytical Program

CHEMICAL ANALYSES OF SOIL	
Aldrin(1)	Heptachlor
Dieldrin	Alpha-Chlordane
Toxaphene	Gamma-Chlordane
Heptachlor epoxide	Dioxin(2)
DISPOSAL CHARACTERIZATION	
TCLP(3)	
PHYSICAL ANALYSES	
Topographic elevation(4)	

Notes:

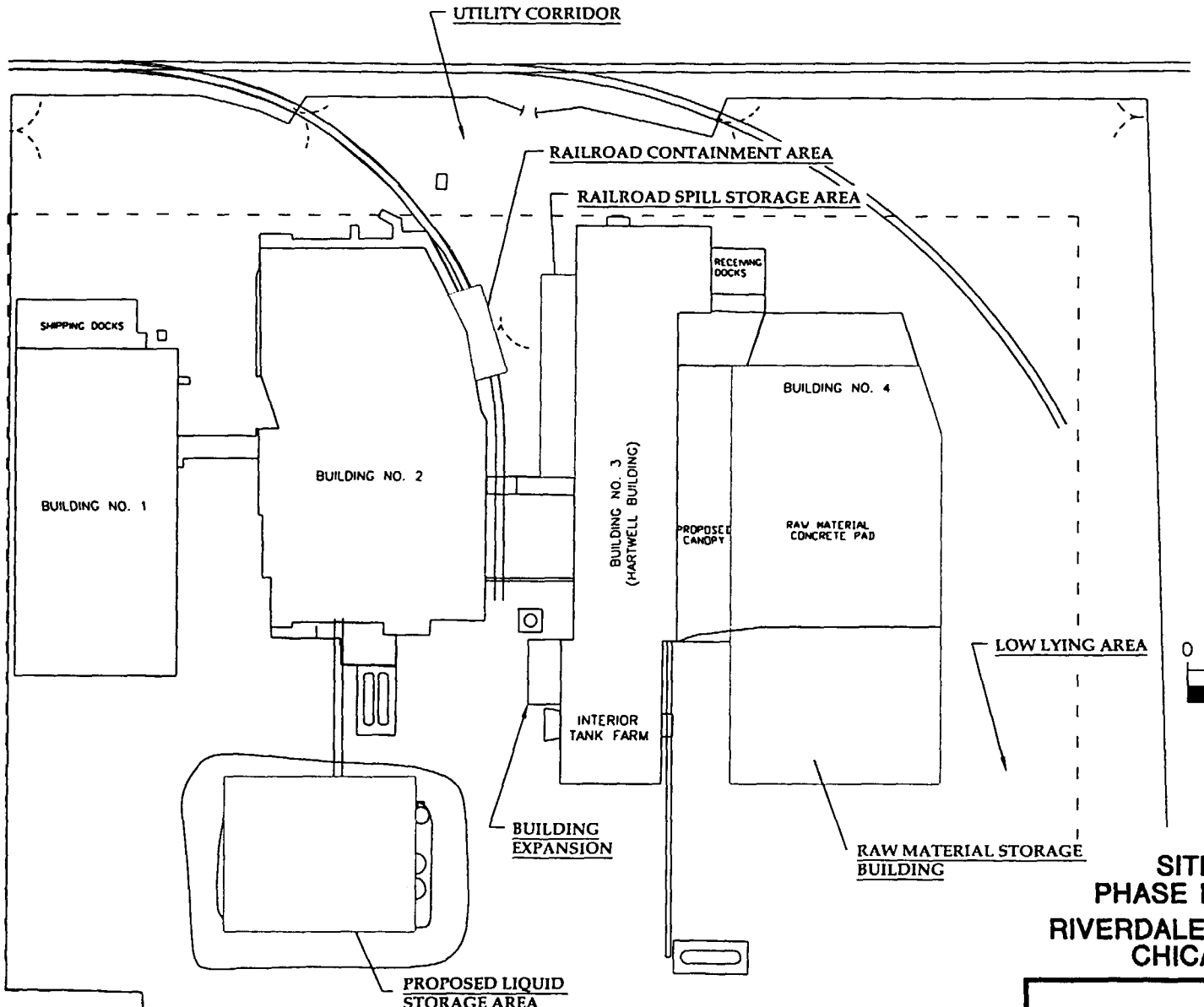
(1) Refer to Section 3 for sampling requirements. Pesticide chemical analyses conducted by analytical method described in the QAPP.

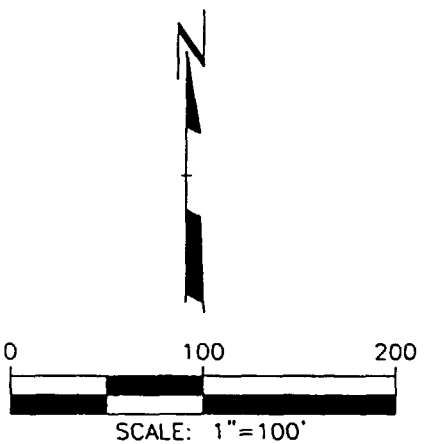
(2) Refer to Section 3 for sampling requirements. Dioxin chemical analyses conducted by analytical method described in the QAPP.

(3) See Table 3-2 for parameters to be analyzed.

(4) In-field measurements.

RMT COMPUTER AIDED DESIGN & DRAFTING





SITE LAYOUT MAP
PHASE I REMOVAL ACTION
RIVERDALE CHEMICAL COMPANY
CHICAGO HEIGHTS, IL

RMT

DWN. BY:	DAY
APPROVED BY:	
DATE:	SEPTEMBER 2000
PROJ. #	4962.01
FILE #	49620150

FIGURE 2-1

SECTION 3

Section 3
Sampling Location and Frequency

The soil-sampling program is summarized in Table 3-1, Soil Sampling Program, which describes the sample locations and number of samples to be collected. Table 3-2, Analytical Parameters, provides the compounds to be analyzed, with proposed analytical requirements described in the subsequent sections. The analytical testing for disposal characterization is provided in Table 3-3, Characterization Parameters. Table 3-4, Summary of Analytical Testing Program, provides a summary of analytical program with quality assurance samples. As described in Section 2, there are three types of designated sampling activities: soil sampling, confirmation sampling, and disposal characterization.

3.1 Soil Sampling

Soil samples will be collected from the liquid storage area, raw materials warehouse, utility area, low lying area at the southeastern side of the site, and the Hartwell Building expansion to characterize soils and to evaluate the extent of any contamination.

Sample locations for the liquid storage area, and raw materials storage area are provided in Figure 3-1 and Figure 3-2, respectively. Four soil borings will be drilled in the utility area, six locations will be sampled in the low lying areas in the southeastern side of the site, and two boring will be drilled at the Hartwell Building expansion . The locations proposed for the utility area, low lying area, and Hartwell Expansion are provided in Figure 3-3, Figure 3-4 and Figure 3-5, respectively. The locations may be modified in the field based on accessibility to the areas.

The chemical analyses will include the COPCs listed in Table 3-2, with the exception of the analysis for dioxin, at all the locations. Soil samples collected from the liquid storage area, raw materials warehouse, and the low lying area located to the southeastern side of the site will be analyzed for the six pesticides COPCs. Several samples will be analyzed for dioxin (2,3,7,8 TCDD) in these areas to confirm the extent, if any, of COPCs with concentrations of COPCs that exceed a calculated total cancer risk above 1×10^{-4} and noncancer hazard index greater than one. Three samples will be analyzed for dioxin in the liquid storage area; one at the east side (Phase 1 liquid storage area construction), one in the middle (Phase 1 liquid storage area construction) and one at the west side (Phase 2 liquid storage area construction). Similarly, two samples will be analyzed for dioxin at the east and west side of the raw materials warehouse. In the low lying area at the southeast side of the site, two locations will be analyzed for dioxin (2,3,7,8 TCDD).

Results of the RI indicate that dioxin has not been detected in the railroad unloading area or the utility area. Therefore, soil samples collected in at those two areas will be analyzed for the six pesticide COPCs.

Analytical methods are provided in the QAPP, included as Appendix A to the Workplan.

3.2 Confirmation Sampling

Soil samples will be collected at the base of the excavation to characterize the residual contamination, if any, at each of the excavations. Sampling locations for the liquid storage area, raw material warehouse, and railroad unloading area are shown on Figures 3-6 through 3-8, respectively.

Consistent with the rational described previously, samples collected from the liquid storage area and raw materials area will be analyzed for the seven COPCs, including dioxin, if required. Samples collected from the railroad car unloading area and the utility area (if excavation is required) will be analyzed for the six pesticides COPCs.

Analytical methods are provided in the QAPP, included as Appendix A to the Workplan.

3.3 Disposal Characterization

The excavated soil will be stockpiled in separate areas at the site. Soil will be stockpiled on visquin liner. The soils will also covered with visquin on a daily basis to manage the excavated soils prior to disposal. Composite samples from six to eight locations on the pile will be collected from the stockpiles following excavation activities. The composite sample will be representative of the excavated soil. The volume of soil to be excavated from this area is not defined at this point, therefore, the exact number of samples to be collected cannot be determined, but at a minimum, one composite sample will be taken from each area of excavation. The chemical analyses will include the characterization parameters listed in Table 3-3.

Analytical methods are provided in the QAPP, included as Appendix A to the Workplan.

Table 3-1
Soil Sampling Locations

SAMPLE LOCATION	PROPOSED NUMBER	DESCRIPTION
Soil Sampling (Horizontal)		
Raw Materials Warehouse	Nineteen locations	Collected at 2 ft bgs and 4 ft bgs
Liquid Storage Area	Seventeen locations	Collected at 2 ft bgs and 4 ft bgs
Utility Area	Four locations	Collected at 2 ft bgs and 4 ft bgs
Low Lying Area	Six locations	Collected at 0.5 ft bgs and 3 ft bgs
Hartwell Building Expansion	Two locations	Collected at 2 ft bgs and 4 ft bgs
Confirmatory Sampling		
Raw Materials Warehouse	Four samples	Collected at base of excavation
Liquid Storage Area	Four samples	Collected at base of excavation
Railroad Unloading Area	Five samples	Collected at base of excavation
Utility Area	One to five samples (based on results of horizontal sampling)	Collected at base of excavation
Disposal Characterization		
Raw Materials Warehouse	Two	Collect from soil stockpile
Liquid Storage Area	One	Collect from soil stockpile
Railroad Unloading Area	Two	Collect from soil stockpile

Table 3-2
Analytical Parameters

COMPOUND[1,2]	QUANTITATION LIMITS
Soil	
Compound (CAS Number)	ug/Kg
2,3,7,8-TCDD[3]	0.1 - 1
Aldrin (309-00-2)	1.7
Chlordane, technical (57-74-9)	1.7
Dieldrin (60-57-1)	3.3
Heptachlor (76-44-8)	1.7
Heptachlor epoxide (1024-57-3)	1.7
Toxaphene (8001-35-2)	170

Notes:

(1) Dioxin compounds in soil are to be analyzed using the procedures in the QAPP.

(2) Pesticide compounds in soil are to be analyzed using the procedures in the QAPP.

(3) The samples for which dioxin analysis is included is described in Section 3.

Table 3-3
Disposal Parameters

TCLP Constituent	Target Quantitation Limit (mg/L)[1]	TCLP Regulatory Level (mg/L)	TCLP Constituent	Target Quantitation Limit (mg/L)	TCLP Regulatory Level (mg/L)
Metals			**Herbicides**		
Arsenic	0.01	5.0	2,4,5-TP Silvex	0.1	1.0
Barium	10	100	2,4-D	0.5	10.0
Cadmium	0.002	1.0	**Semivolatiles (b/n)**		
Chromium	0.005	5.0	1,4-Dichlorobenzene	0.05	7.5
Lead	0.003	5.0	2,4-Dinitrotoluene	0.05	0.13
Mercury	0.002	0.2	Hexachlorobenzene	0.05	0.13
Selenium	0.005	1.0	Hexachlorobutadiene	0.05	0.5
Silver	0.005	5.0	Hexachloroethane	0.05	3.0
Pesticides			Nitrobenzene	0.05	2.0
Chlordane (technical)	0.005	0.03	Pyridine	0.1	5.0
Endrin	0.0005	0.02	**Volatiles**		
Heptachlor	0.0005	0.008	Benzene	0.025	0.5
Lindane	0.0005	0.4	Carbon tetrachloride	0.025	0.5
Methoxychlor	0.001	10.0	Chlorobenzene	0.025	100.0
Toxaphene	0.02	0.5	Chloroform	0.025	6.0
Semivolatiles (a)			1,2-Dichloroethane	0.025	0.5
O-Cresol	0.05	200	1,1-Dichloroethylene	0.07	0.7
m-Cresol	0.1	200	Methyl ethyl ketone	20	200.0
p-Cresol	0.1	200	Tetrachloroethylene	0.07	0.7
Cresol*	0.1	200	Trichloroethylene	0.05	0.5
2,4,5-Trichlorophenol	0.05	400	Vinyl chloride	0.05	0.2
2,4,6-Trichlorophenol	0.05	2			
Pentachlorophenol	0.1	100			

1) The target quantitation limits have been requested from the laboratory

* If o-, m-, and p-cresol cannot be differentiated, the total cresol concentration is used.

(a) = acid extractable semivolatiles.

(b/n) = base neutral extractable semivolatiles.

Table 3-4
Summary of Analytical Testing Program

MATRIX	ANALYTICAL GROUPS(1)	TOTAL SAMPLES	DUPLICATE SAMPLES	MS/MSD	TOTALS
Soil					
Horizontal Sampling					
Raw Materials	Pesticides(3)	9	0	1	9
	Dioxin(4)	2	0	1	2
Liquid Storage	Pesticides	11	1	1	12
	Dioxin	3	0	1	3
Utility Area	Pesticides	8	1	1	9
	Dioxin	0	0	0	0
Low Lying Area	Pesticides	8	1	1	9
	Dioxin	2	1	1	3
Hartwell Building Exp.	Pesticides				
	Dioxin				
Soil					
Confirmatory Sampling					
Raw Materials	Pesticides	1	0	0	1
	Dioxin	0	0	0	0
Liquid Storage	Pesticides	2	0	0	2
	Dioxin	0	0	0	0
Railroad Unloading	Pesticides	3	0	0	3
	Dioxin	0	0	0	0
Utility Area	Pesticides	TBD	TBD	TBD	TBD
	Dioxin				
Soil					
Disposal Characterization					
Raw Materials	TCLP	2	0	0	1
Liquid Storage	TCLP	1	0	0	1
Railroad Unloading	TCLP	2	0	0	1

Notes:

Analytical groups are defined as follows:

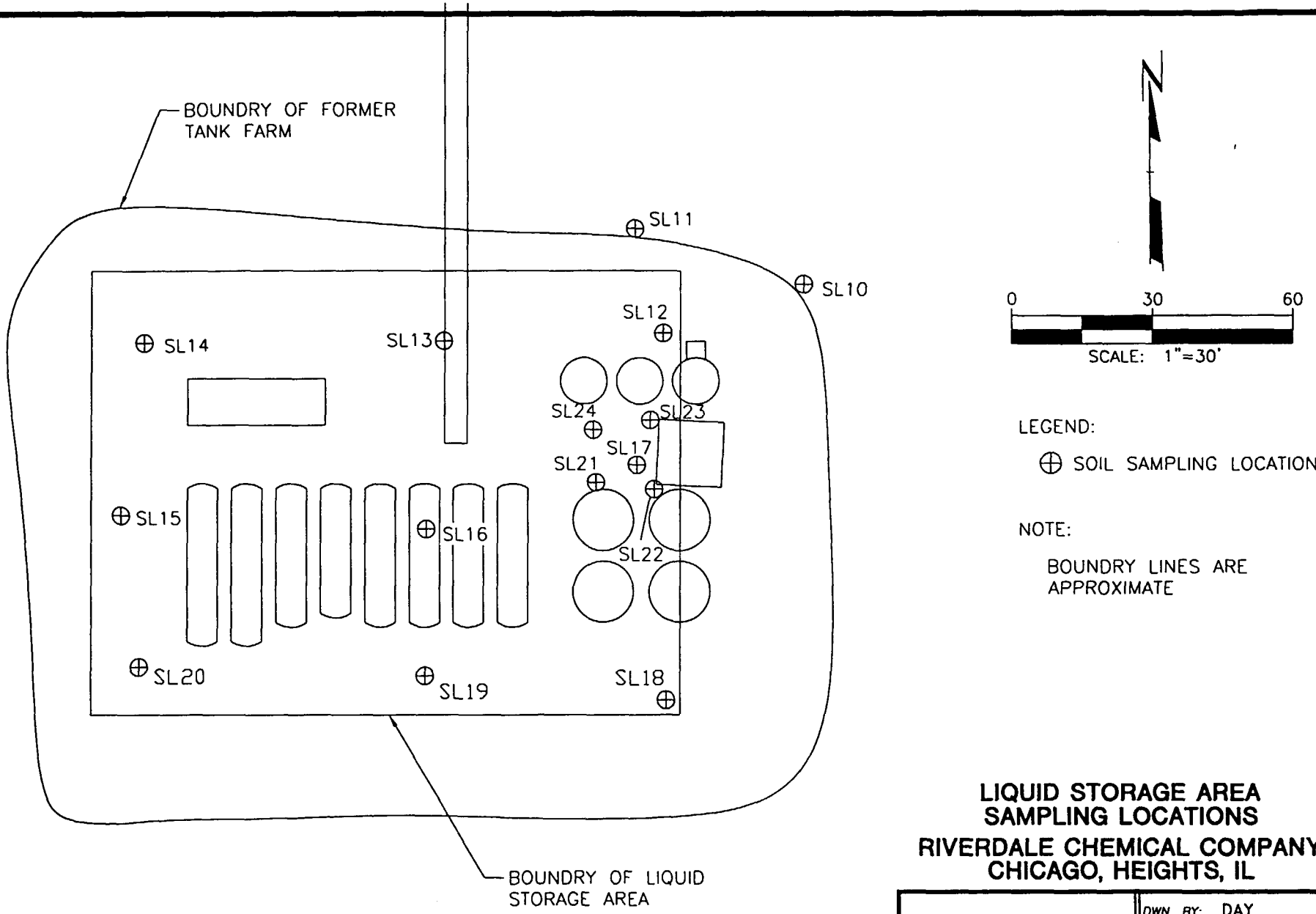
(1) Pesticides and Dioxin (2,3,7,8 TCDD): See Table 2-1 of the FSAP.

(2) Total reflects that each MS/MSD is not counted as an additional sample.

(3) Pesticide chemical analyses conducted by analytical method described in the QAPP.

(4) Dioxin chemical analyses conducted by analytical method described in the QAPP.

RMT COMPUTER AIDED DESIGN & DRAFTING



LEGEND:

⊕ SOIL SAMPLING LOCATION

NOTE:

BOUNDRY LINES ARE APPROXIMATE

LIQUID STORAGE AREA SAMPLING LOCATIONS

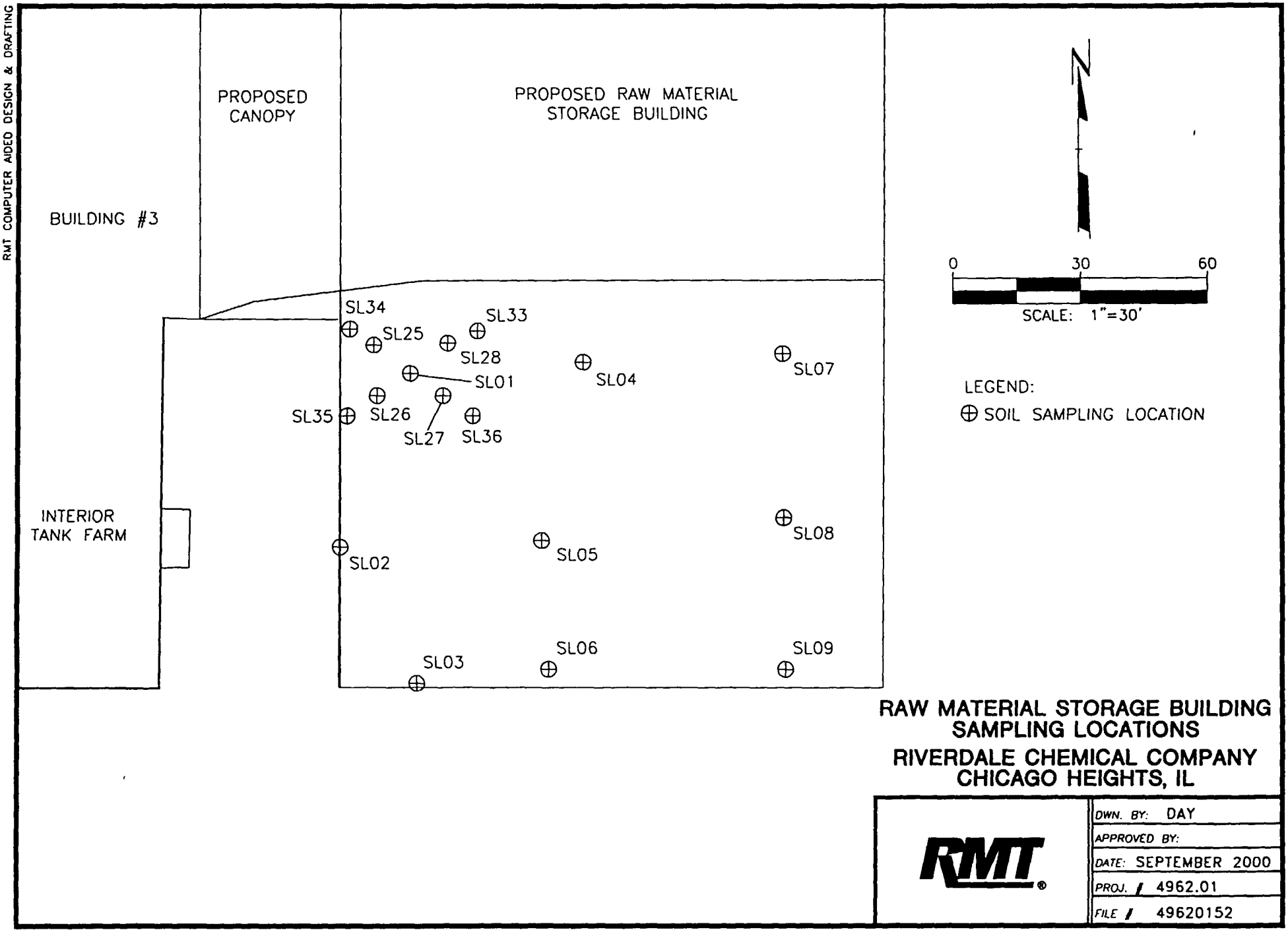
RIVERDALE CHEMICAL COMPANY CHICAGO, HEIGHTS, IL

RMT

DWN. BY:	DAY
APPROVED BY:	
DATE:	SEPTEMBER 2000
PROJ. #	4962.01
FILE #	49620151

FIGURE 3-1

RMT COMPUTER AIDED DESIGN & DRAFTING



RAW MATERIAL STORAGE BUILDING SAMPLING LOCATIONS

RIVERDALE CHEMICAL COMPANY CHICAGO HEIGHTS, IL

RMT

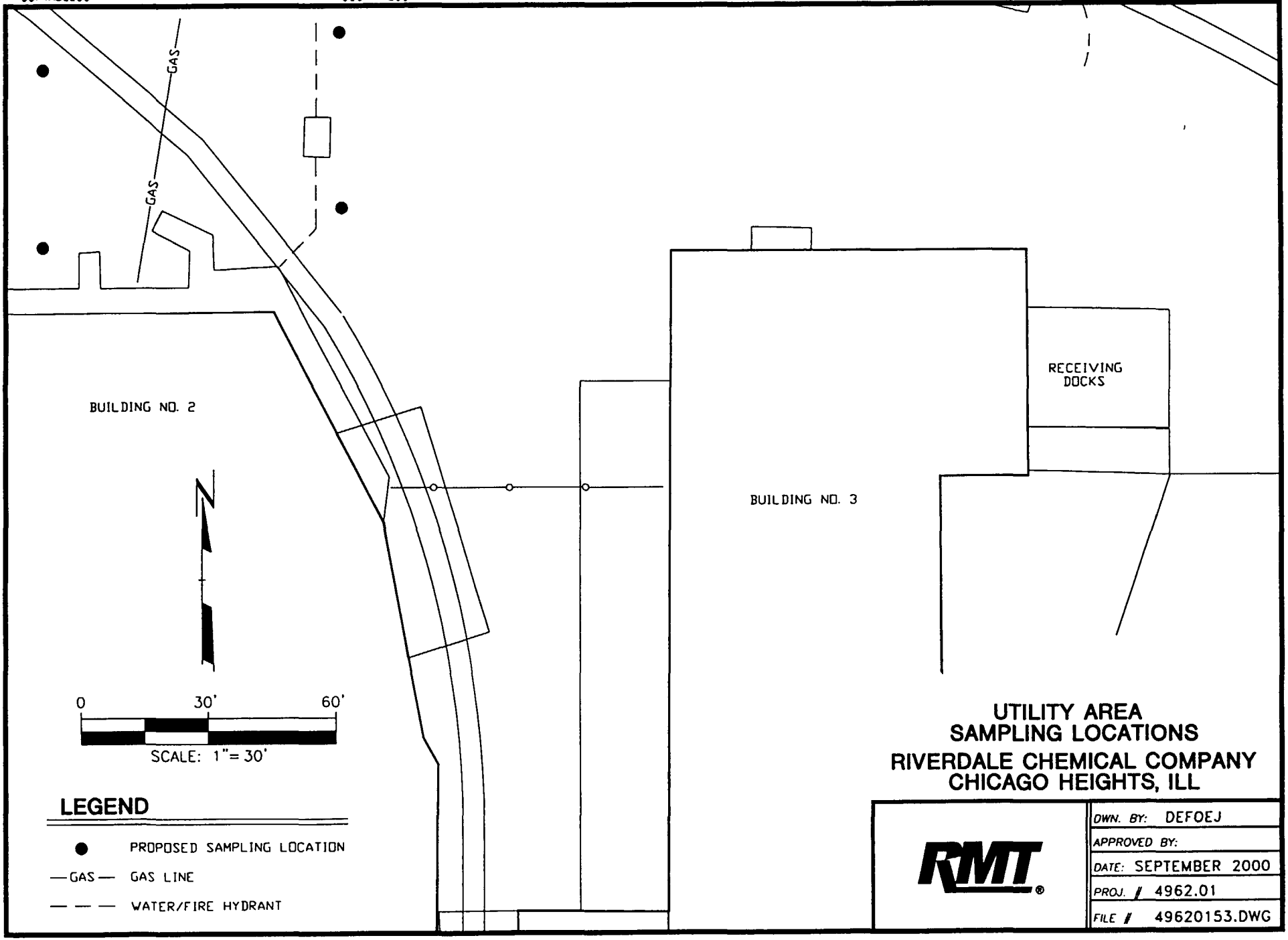
DWN. BY:	DAY
APPROVED BY:	
DATE:	SEPTEMBER 2000
PROJ. #	4962.01
FILE #	49620152

FIGURE 3-2

$$DWG$$ $$PLOTTER$$
$$USER$$ $$SCALE$$
$$PRF$$ $$ROT$$
$$PTABLE$$ $$SYTIME$$

Attached Xref's: No xref's Attached.

RMT COMPUTER AIDED DESIGN & DRAFTING



UTILITY AREA SAMPLING LOCATIONS

RIVERDALE CHEMICAL COMPANY CHICAGO HEIGHTS, ILL

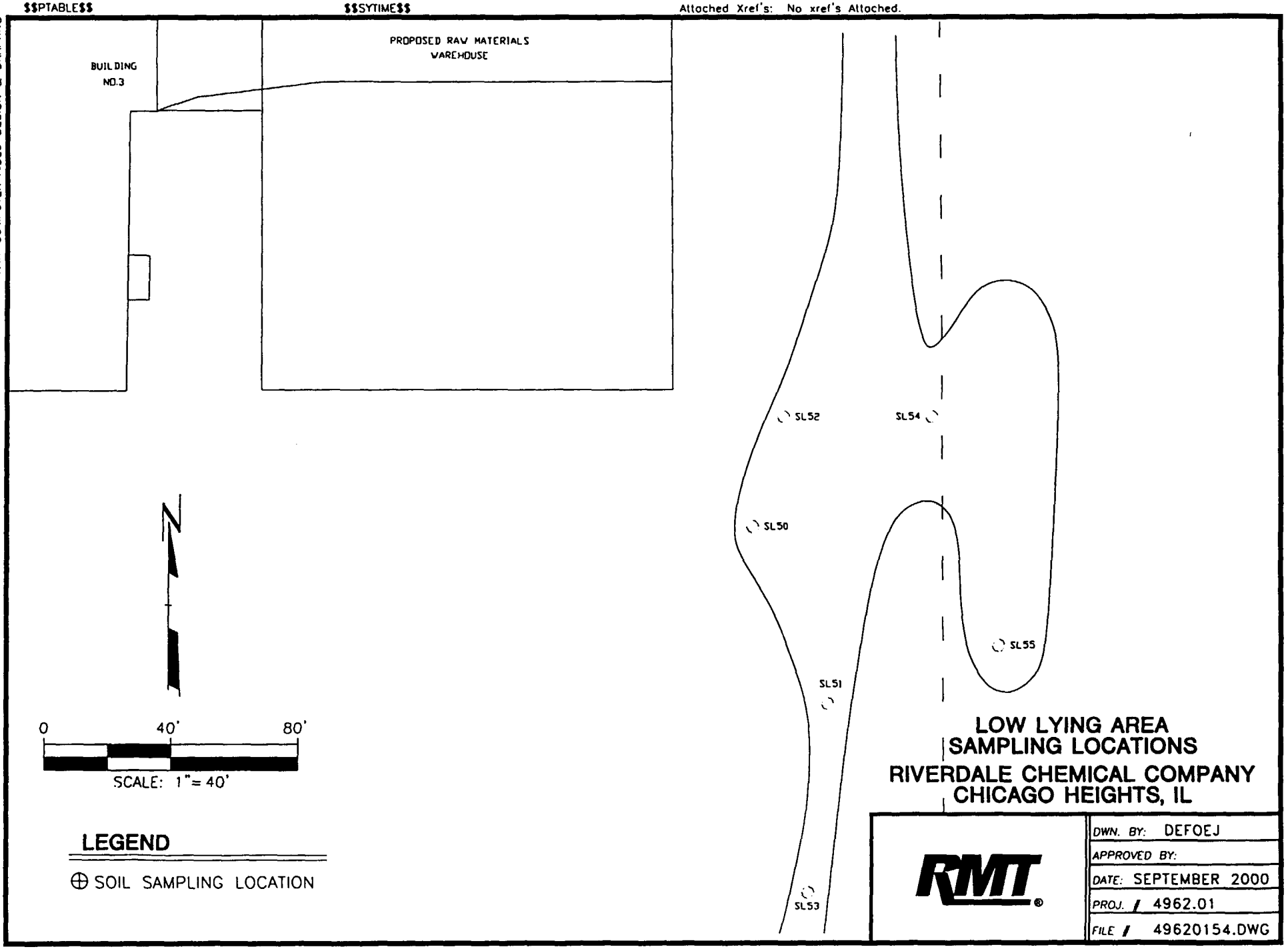
RMT

DWN. BY:	DEFOEJ
APPROVED BY:	
DATE:	SEPTEMBER 2000
PROJ. #	4962.01
FILE #	49620153.DWG

FIGURE 3-3

PLOT DATA
$$DWG$$
$$USER$$
$$PRF$$
$$PTABLE$$
$$PLOTTER$$
$$SCALE$$
$$ROT$$
$$SYTIME$$
Attached Xref's: No xref's Attached.

RMT COMPUTER AIDED DESIGN & DRAFTING



LEGEND

⊕ SOIL SAMPLING LOCATION

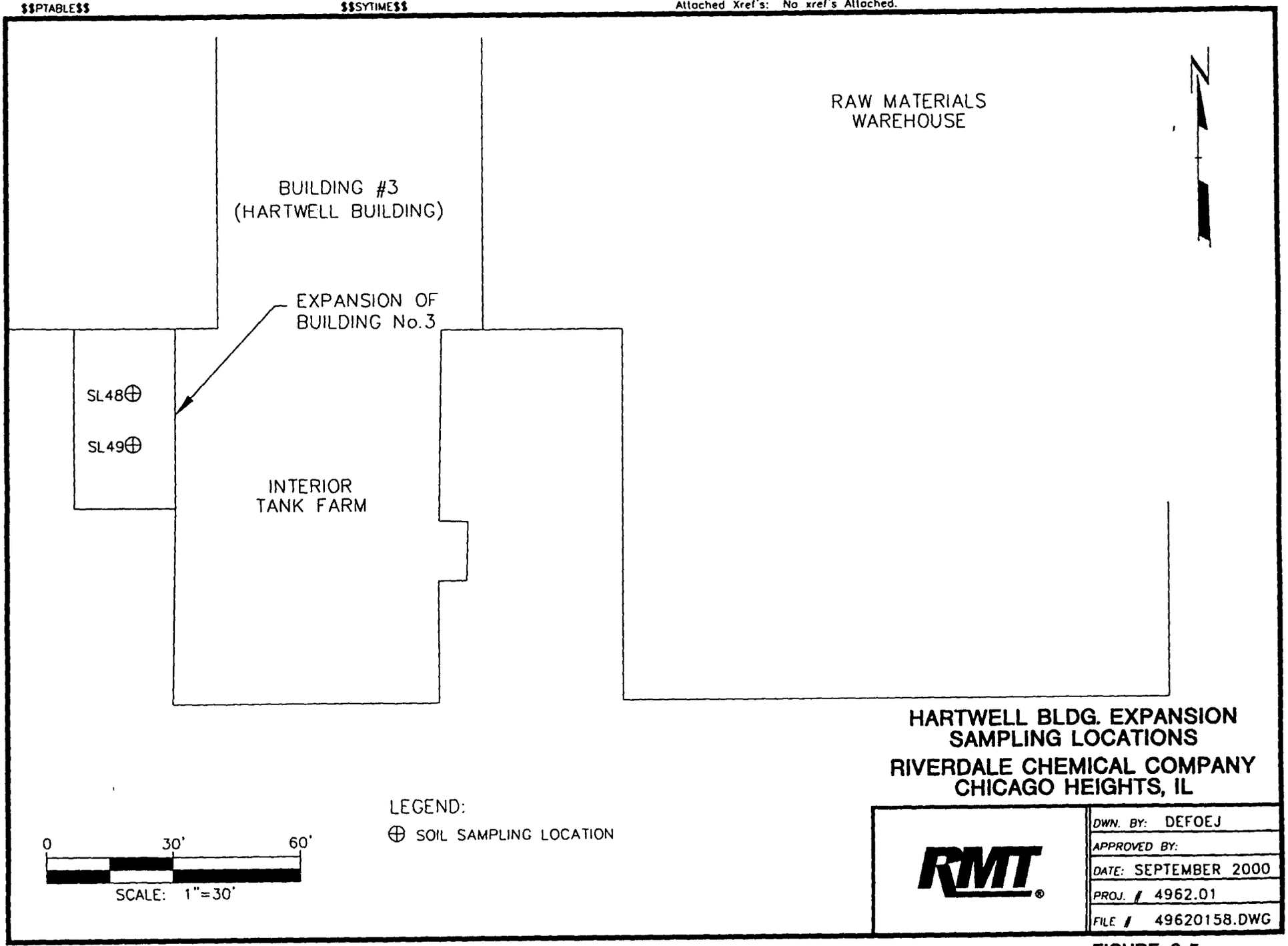
LOW LYING AREA SAMPLING LOCATIONS

RIVERDALE CHEMICAL COMPANY CHICAGO HEIGHTS, IL

RMT

DWN. BY:	DEFOEJ
APPROVED BY:	
DATE:	SEPTEMBER 2000
PROJ. #	4962.01
FILE #	49620154.DWG

FIGURE 3-4



HARTWELL BLDG. EXPANSION
SAMPLING LOCATIONS

RIVERDALE CHEMICAL COMPANY
CHICAGO HEIGHTS, IL

RMT

DWN. BY:	DEFOEJ
APPROVED BY:	
DATE:	SEPTEMBER 2000
PROJ. #	4962.01
FILE #	49620158.DWG

FIGURE 3-5

PLOT DATA
$$DWG$$
$$USER$$
$$PRF$$
$$PTABLE$$
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$$SYTIME$$
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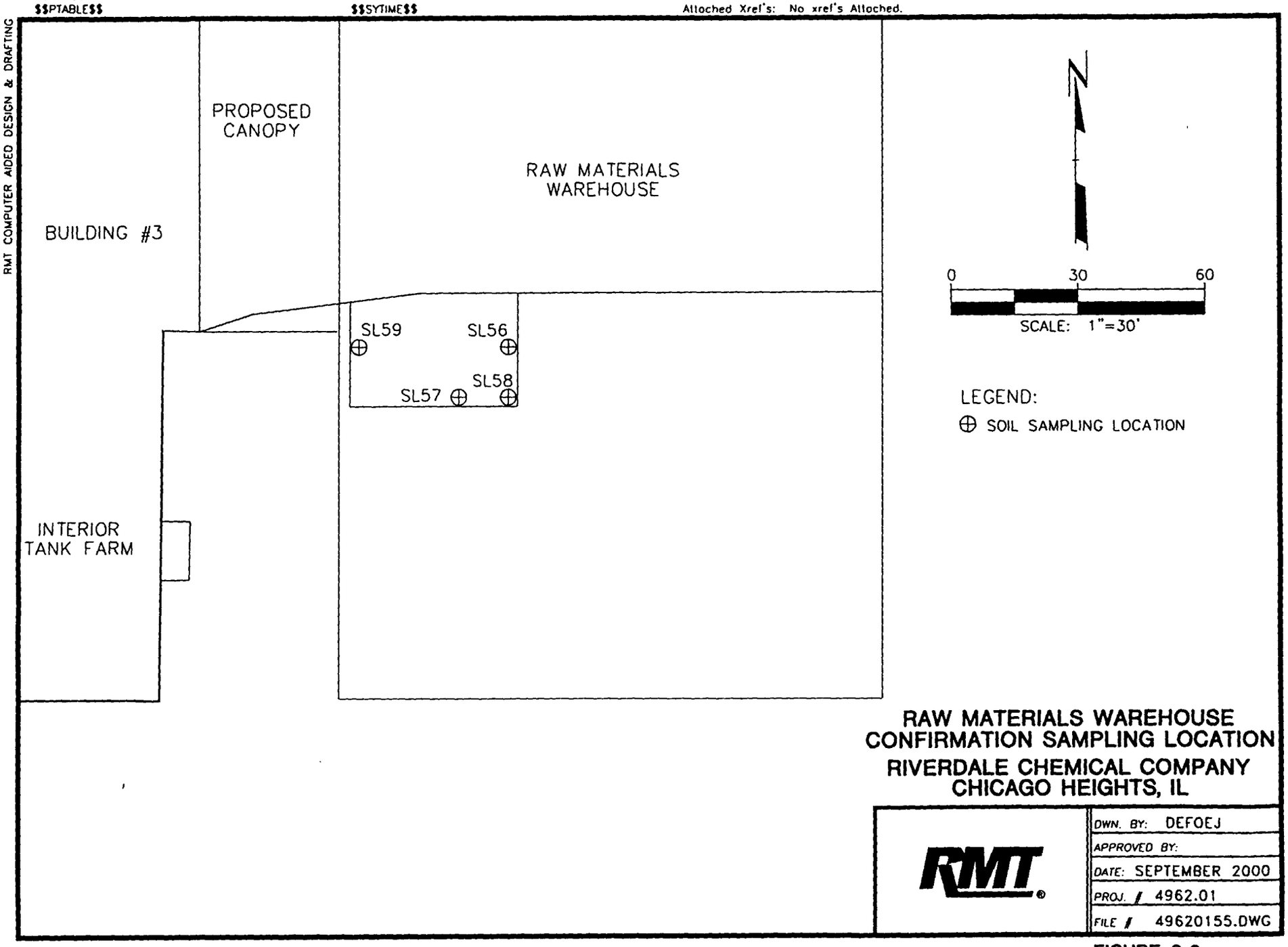
RMT COMPUTER AIDED DESIGN & DRAFTING



RAW MATERIALS WAREHOUSE CONFIRMATION SAMPLING LOCATION

RIVERDALE CHEMICAL COMPANY CHICAGO HEIGHTS, IL

RMT

DWN. BY:	DEFOEJ
APPROVED BY:	
DATE:	SEPTEMBER 2000
PROJ. #	4962.01
FILE #	49620155.DWG

FIGURE 3-6

PLOT DATA
$$DWG$$
$$USER$$
$$PRF$$
$$PTABLE$$
$$PLOTTER$$
$$SCALE$$
$$ROT$$
$$SYTIME$$

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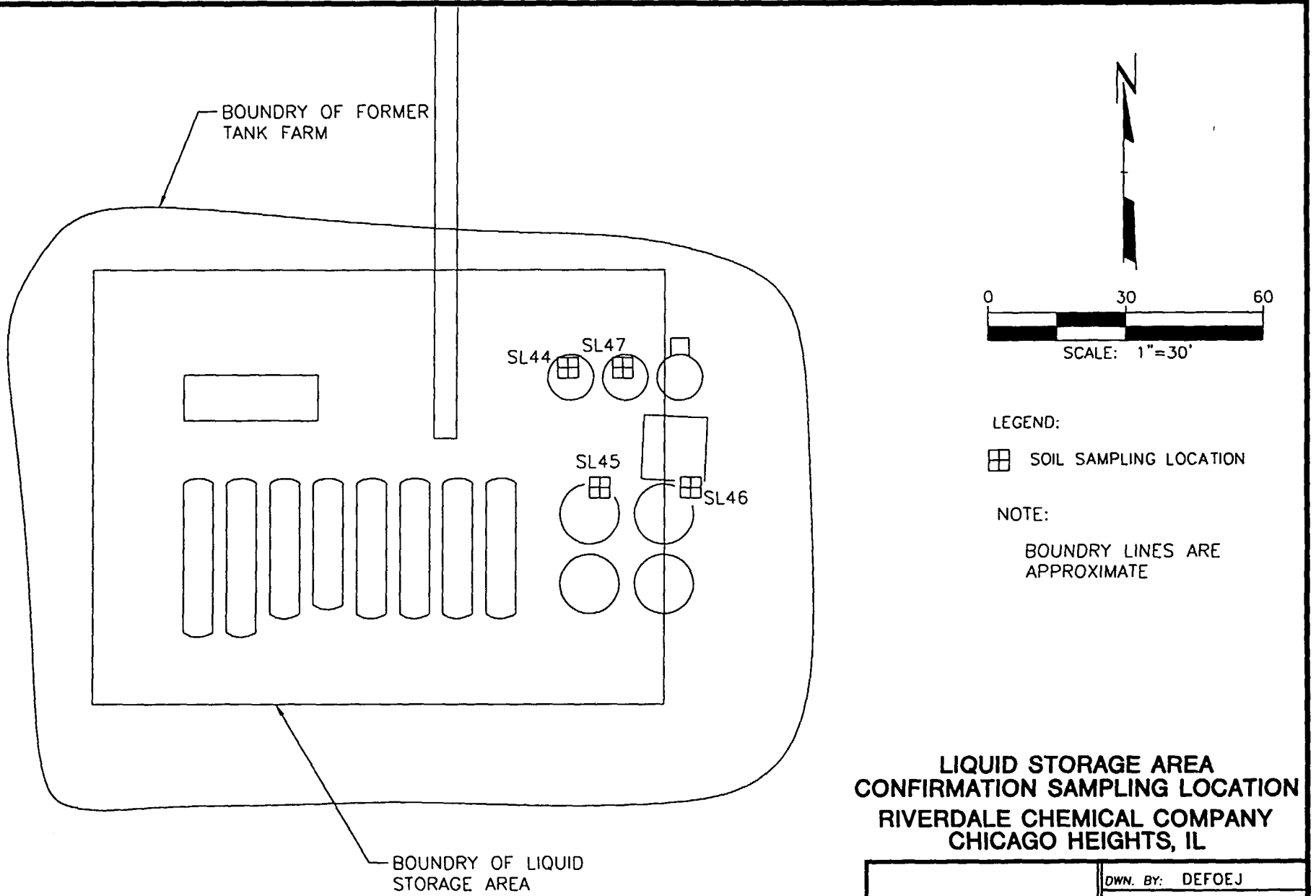


LEGEND:

⊞ SOIL SAMPLING LOCATION

NOTE:

BOUNDRY LINES ARE APPROXIMATE

LIQUID STORAGE AREA CONFIRMATION SAMPLING LOCATION
RIVERDALE CHEMICAL COMPANY CHICAGO HEIGHTS, IL

RMT

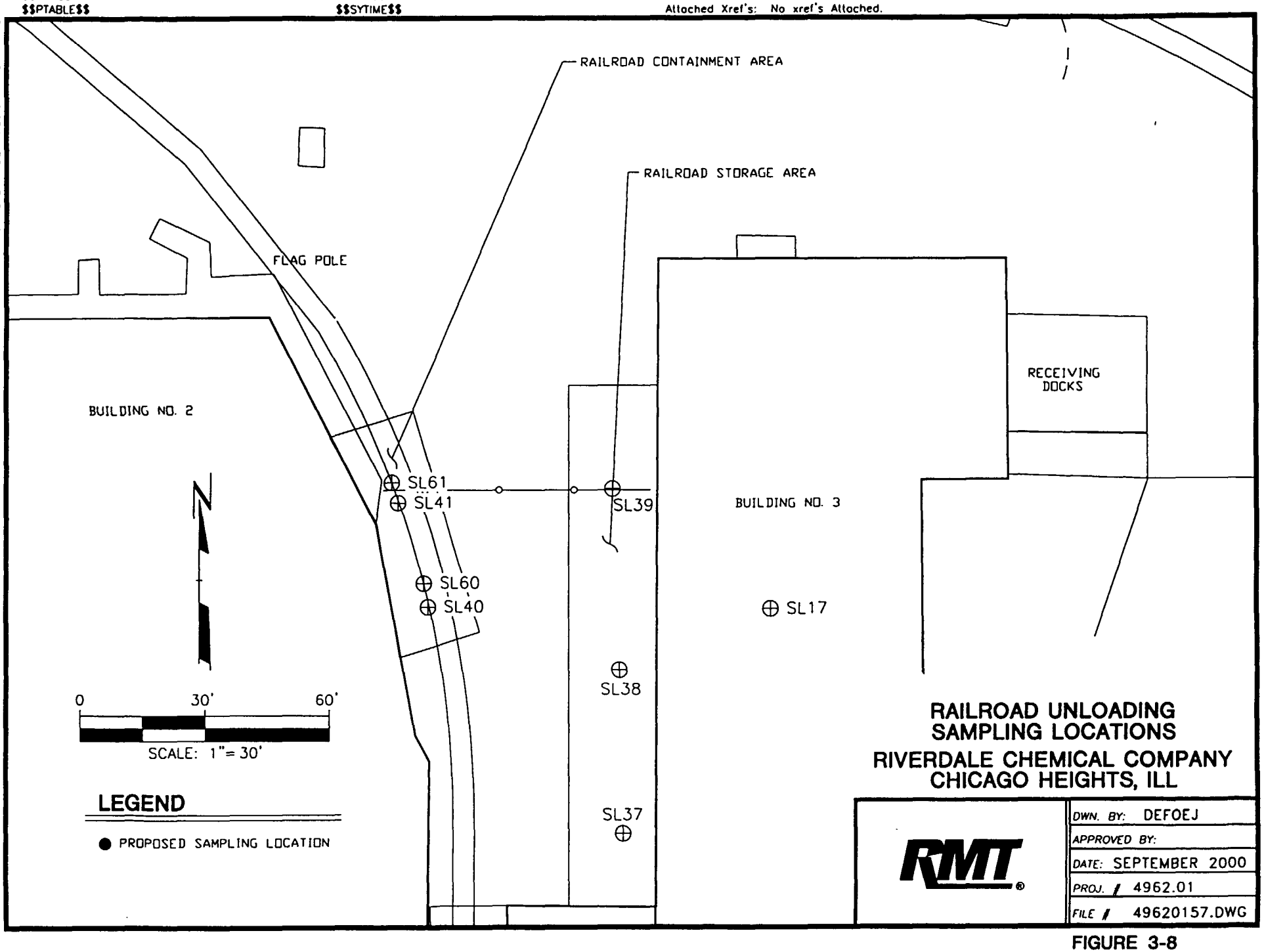
DWN. BY:	DEFOEJ
APPROVED BY:	
DATE:	SEPTEMBER 2000
PROJ. #	4962.01
FILE #	49620156.DWG

FIGURE 3-7

PLOT DATA
$$DWG$$ $$PLOTTER$$
$$USER$$ $$SCALE$$
$$PRF$$ $$ROT$$
$$PTABLE$$ $$SYTIME$$

Attached Xref's: No xref's Attached.

RMT COMPUTER AIDED DESIGN & DRAFTING



RAILROAD UNLOADING SAMPLING LOCATIONS

RIVERDALE CHEMICAL COMPANY CHICAGO HEIGHTS, ILL

RMT

DWN. BY:	DEFOEJ
APPROVED BY:	
DATE:	SEPTEMBER 2000
PROJ. #	4962.01
FILE #	49620157.DWG

FIGURE 3-8

SECTION 4

Section 4
Investigation Procedures

The following presents the investigation procedures applied to the investigation. The data collection activities and detailed testing methods and procedures are discussed in the QAPP, included as an appendix to this Phase I RA Workplan. Sampling and removal action activities will be conducted to be consistent with current OSHA regulations and protocols which have been designed to protect on-site personnel from potential hazards associated with the site activities as described in the HSP, also included as an appendix.

4.1 Sample Designation

Soil samples will be collected for the visual/manual description of the soil type as well as for chemical analysis. Each sample will be designated with the identification of the sampling location and depth below grade.

The samples will be identified by a number and depth, for example, SL10- 3 feet, with the "SL" identifying the sampling location and the "3 feet" signifying the depth from which the sample was taken. Additional sampling locations will be numbered sequentially. Field duplicates will be identified by including the suffix "dup." Samples designated for matrix spike/matrix spike duplicate analysis (MS/MSD) will be identified by including the suffix "MS/MSD".

4.2 Chain-of-Custody Procedures

The sampler is responsible for sample custody from the time of sample collection to receipt at the laboratory or until samples are shipped by commercial carrier. A sample is considered under custody if

- the sample is in a person's possession;
- the sample is in that person's view after being in his or her possession;
- the sample was in that person's possession and then placed in a secured location; or
- the sample is in a designated and identified secure area.

Chain-of-custody procedures are further discussed in Section 5 of the QAPP, which is appended to the Workplan. Examples of laboratory chain-of-custody forms are provided in Attachment A of the FSAP and will be used for all samples.

4.3 Field Records and Photographs

This section of the FSAP describes requirements and procedures for documentation of field activities. It is essential that all field documentation provide a clear, unbiased description of field activities.

Field notebooks will be used on work assignments requiring field activities. Daily field activities log notebooks will contain bound and numbered forms as provided in Attachment A. The on-site coordinator (OSC) will be responsible for issuing field notebooks. A record will be maintained by the OSC documenting the assignment of field notebooks. The OSC will distribute and track bound and numbered field notebooks. Transfers of field notebooks to other individuals (including subcontractors) who have been designated to perform specific tasks on the project will be recorded. No field notes may be destroyed or thrown away, even if they are illegible, or known to contain inaccuracies.

Entries into field notebooks will be legibly written and will provide a clear record of field activities. Entries will be made in waterproof ink and in language that is objective, factual, and free of personal opinions or terminology that might later prove unclear or ambiguous. Errors in the field notes will be indicated by drawing a single line through the text, such that the text in error remains legible. Errors addressed in this manner will be initialed and dated by the person making the correction. The person taking notes in the field book will sign, number, and date each page and identify the date, time, location on-site, field personnel present, and observed weather conditions.

Field personnel responsible for taking notes will log photographs taken in the field in the field notebook. Locations of photographs will be referenced to a site sketch or map. Use of measurements from on-site health and safety equipment and readings will be recorded. Observed potential hazards to health and safety will be described. The level of protection and decontamination procedure used will be documented.

Photographs taken in the field will be documented in the field notebook at the time the photograph is taken. After the film is developed, each slide or print will be labeled with the following information:

- Project identification number
- Date
- Location
- Direction
- Roll number
- Frame number
- Sample number (if appropriate)
- Initials of the photographer

4.4 Sampling Procedures

4.4.1 General

The sampling protocols for the Phase I RA are described for each of the sampling types; soil sampling, vertical confirmation sampling and disposal characterization. Soil sampling procedures are designed to provide representative samples that have not been altered or contaminated by the sampling procedures. The specific procedures outlined in the following paragraphs are based on accepted and established procedures.

Soil Sampling

Sample collection activities include the collection of samples at the raw materials warehouse, the liquid storage area, the utility area and the low lying area in the south east side of the site. Sampling will include drilling with an auger or Geoprobe to extract soil samples, collecting soil samples, decontaminating equipment, backfilling the borings, and preparing the samples for shipment to the laboratory.

Techniques will be followed for soil sampling as described below:

1. Determine sampling locations, and mark with spray paint (if appropriate).
2. Provide oversight as drilling contractor drills through the surface crushed limestone using hollow-stemmed auger or Geoprobe. Note the depth of this layer.
3. Driller collects soil with a standard 2-inch-ID split-spoon sampler or a macrocore sleeve.
4. For each sample that is extracted, note the geology of the soil and depth of each soil type (*e.g.*, crushed limestone, fill, clay, etc.) in the field notebook.
5. Collect the first sample from each location approximately 2 feet bgs (the first interval with recovery) and at 4 feet bgs. Place samples into separate 4 oz. glass jars with Teflon-lined lids. All samples collected will be labeled with the sampling location number and the depth at which the sample was collected (*e.g.*, SL10 - 3 feet).
6. Place samples on ice in a cooler immediately following collection.
7. Dispose of bored soil in a 55 gallon USDOT-approved steel drum. Decontaminate split-spoon sampler or Geoprobe by hand in an Alconox solution.
8. Backfill soil boring with bentonite chips.

9. Once backfilling is complete, mark each boring location. Tie fluorescent tape to a metal stake and hammer into the soil.
10. Complete sample collection and chain-of-custody documentation.

The soil samples will be placed in an iced cooler and stored in accordance with chain-of-custody requirements specified in the QAPP until shipment to the laboratory (or laboratories) is arranged. Sample collection will be recorded in field notebooks for each sample as described in this FSAP. An example of the log is provided in Appendix A. Chain-of-custody forms will be completed for all samples as described in the QAPP.

Soils generated by the sampling and in-field analyses will be stored on site in USDOT- approved 55-gallon drums. The soils will be characterized and disposed of accordingly by Riverdale Chemical Company.

Confirmation Sampling

Sample collection activities include collecting a discrete soil sample from the base of excavations at the raw materials storage area, liquid storage area, railroad unloading area, and utility area, if necessary. Samples will be collected, followed by, decontaminating equipment, and preparing the samples for shipment to the laboratory.

Techniques will be followed for soil sampling as described below:

1. Determine sampling locations.
2. Collect soil with a stainless steel spoon or trowel.
3. For each sample that is extracted, note the geology of the soil and depth of each soil type (*e.g.*, crushed limestone, fill, clay, etc.) in the field notebook.
4. Place samples into separate 4 oz. glass jars with Teflon-lined lids. All samples collected will be labeled with the sampling location number and the depth at which the sample was collected.
5. Place samples on ice in a cooler immediately following collection.
6. Decontaminate sampling equipment in an Alconox solution.
7. Complete sample collection and chain-of-custody documentation.

The soil samples will be placed in an iced cooler and stored in accordance with chain-of-custody requirements specified in the QAPP until shipment to the laboratory (or laboratories) is arranged. Sample collection will be recorded in

field notebooks for each sample as described this FSAP. An example of the log is provided in Appendix A. Chain-of-custody forms will be completed for all samples as described in the QAPP.

Disposal Characterization

Sample collection activities include collecting composite soil samples from each soil stockpile, decontaminating equipment, and preparing the samples for shipment to the laboratory.

Techniques will be followed for soil sampling as described below:

1. Collect the composite sample with stainless steel sampling equipment. All samples collected will be labeled with the sampling location number (soil stockpile).
2. Place samples on ice in a cooler, if required, and ship to laboratory following collection under chain-of-custody procedures.

4.4.2 General Quality Assurance Considerations

The sample collection procedures presented in this FSAP are designed to provide samples of the required quality for the initial soil sampling investigation. All field personnel will be required to understand the requirements of this FSAP and will be trained in the use of the equipment and the techniques specified.

The OSC is responsible for reviewing the soil sampling activities to ensure that the procedures in the Plan are followed. Specific activities that will be implemented by the OSC include the following:

- Convening a meeting of field personnel at the start of a specific sampling event to review the sampling requirements of the Plan, the necessary equipment and decontamination requirements, and the required documentation.
- Reviewing all documentation for completeness, errors, problems, and corrective actions taken.
- Implementing in-field corrective actions. The Investigation Task Leader will be notified of significant problems and, if necessary, will work with the OSC to develop corrective actions. The Task Leader will be responsible for implementing corrective actions that need to be applied to areas other than field activities.

The equipment used for in-field measurement will be maintained, calibrated, and used in the field according to the procedures are described in Section 4 of this FSAP. The process will be documented, and the OSC will periodically review the documentation

and inspect the equipment to ensure that the procedures are followed by the personnel collecting the samples. Significant deviations from the FSAP, errors, equipment failures, or other problems will be recorded in the field notebook by the OSC. Corrective actions and additional notifications will be coordinated by the OSC.

The contractors operating drilling rigs are required to understand the use of their equipment and will be required to clean and maintain the equipment in proper working order. Field staff will observe contractor activities and note any actions that may impair the quality of the sample collection efforts. Problems will be recorded in the field notebook, and the OSC will be notified. Corrective actions, if required, will be coordinated by the OSC.

Personnel involved in the collection of samples are required to read, understand, and follow the procedures specified in this FSAP. Problems that may affect the quality of the sampling effort will be recorded in the field notebook by the field personnel most directly involved with the problem, and the OSC will be notified. The OSC is responsible for coordinating the development and implementation of corrective actions.

4.4.3 Analytical Quality Assurance Considerations

Field Duplicates

Field duplicate samples, prepared by splitting a single sample between two separate containers, will be used to evaluate sampling precision. Points where duplicate samples are to be collected will be selected by the field personnel and will be submitted as duplicates to the laboratory. One field duplicate will be collected with each round of sampling as described in Table 3-4.

Field duplicate sample identification protocols are provided in Section 4 of the FSAP.

Matrix Spikes/ Matrix Spike Duplicates (MS/MSD) and Sample Spikes/Laboratory Duplicates

MS/MSD samples provide information about the effect of the sample matrix on the sample preparation and measurement methodology. MS/MSD samples will be analyzed for pesticides in accordance with the laboratory operating procedures provided in the QAPP. In conjunction with other QC data, the spikes and duplicates give information on the precision and accuracy of the

analytical method on the various sample matrices. One MS/MSD sample will be collected and prepared for every 20 or fewer investigative samples collected during a sampling round. The MS/MSD samples will consist of triple the normal sample volume for pesticides, provided adequate sample volume is available. Field personnel will select the sampling locations where MS/MSD samples are collected.

4.5 Sample Handling and Analyses

This section presents general sample handling and analysis protocols. Additional detailed information is contained in the QAPP. Severn Trent Laboratories, Inc. (STL), of North Canton, Ohio, will perform the pesticide chemical analyses and will provide all necessary sample containers. STL, of West Sacramento, California, will perform the dioxin analysis.

4.5.1 Sample Containers, Preservation, and Holding Times

Sample containers, preservation methods, and holding times that meet USEPA standards for solid and liquid samples intended for chemical analyses are summarized in Table 4-1.

Table 4-1
Soil Sample Containers and Preservation Methods

PARAMETER	MATRIX	CONTAINER(S)[2],[3]	MINIMUM SAMPLE VOLUME	FIELD FILTER (0.45 µm)	FIELD PRESERVATION METHOD	HOLDING TIME[3]
Pesticides	S	4-oz glass jar (pesticides)	4 oz	NA	Cool to 4°C.	10 days for pesticide extraction/40 days to pesticide analysis
Dioxin (2,3,7,8 TCDD)	S	4-oz. glass jar (dioxin)	4 oz.	NA	Cool to 4°C.	30 days for dioxin extraction/45 days to dioxin analysis

Notes:
S = soil.
NA = not applicable.
(1) Triple the normal sample volume is required for the QC sample for all analytes for Severn Trent laboratory analyses.
(2) The holding time is from sample collection, unless otherwise specified.
(3) STL meets EPA Specifications For Obtaining Contaminant-free Sample Containers.

Samples for chemical analyses will be kept in the dark and on ice in a Styrofoam or hard plastic ice chest or cooler from the time the samples are collected until they are delivered to the laboratory. Filled sample containers will be double-bagged in clear plastic bags and placed inside the cooler to allow sample labels to be seen.

For delivery of samples to the laboratory, the following procedures will be implemented:

1. Collect and preserve the samples as outlined in the QAPP.
2. Place sample containers in laboratory shipping container(s). Pack samples securely with packing material to protect sample containers from accidental breakage during shipment and to ensure that the samples do not leak or spill.
3. Fill shipping container with enough ice to last the trip. Double-bag the ice to ensure sample integrity. Do not use dry ice and/or blue ice (ice packs).
4. Complete the Chain-of-Custody Records as described in Section 5 of the QAPP.
5. Tape the Chain-of-Custody Record to the inside of the shipping container lid.
6. Seal the shipping container with strapping tape, and place two custody seals (provided by the laboratory) on the top of the shipping container prior to shipping. Place one seal on the top left-rear side and the second on the top right-front side.
7. Deliver or ship the container to the laboratory. Use overnight shipping methods whenever required by short holding times or project schedules. Ensure that sample shipment is in compliance with current USDOT and IATA/ICAO regulations.

Responsibility for proper use of containers and preservatives will be under the oversight of the RMT OSC and STL.

4.5.2 Sample Container Procurement Procedures

STL meets USEPA Specifications for Obtaining Contaminant-free Sample Containers; they obtain their sample containers from Environmental Sampling Supply (ESS). A copy of the certificate of compliance is on file at RMT.

4.5.3 Selection of Analytes

The analytical program for the soil sampling is presented in Section 3 of the Workplan.

4.5.4 Analytical Procedures

The selection of analytical procedures will reflect USEPA-approved methodology from the Contract Laboratory Program (CLP) Statements of Work for pesticides and dioxin, as stated in Section 7 of the QAPP. Other methods designed to meet project-specific objectives are also defined in the QAPP, Section 7.

4.6 Field Physical Methods

Field measurements of topographic features, and physical measurements will be required during the field investigations. The scope of such measurements depends upon the purpose of the particular investigation.

Physical measurements should be traceable to the actual person making the measurement and to the actual piece of field equipment used to make that measurement. Equipment maintenance and calibration records will be kept in the field notebook, making all such procedures traceable. Time records will be kept using local time in the 2400-hour military format, recorded to the nearest 5 minutes.

Sampling locations utilized during the field investigation will be surveyed and depicted on the topographic map(s) developed for the Site in such a manner that there location(s) are firmly established. Surveying will be conducted according to the standard procedures described below. Control points used during the survey will be marked in the field and noted on the topographic map(s).

4.6.1 Site Mapping

Site mapping will be conducted to different levels of accuracy based on the specific project needs.

Horizontal Survey of Soil Sampling Locations

Accurate, complete, and informative field notes in surveying are a primary objective in site mapping. The field notes are the most reliable record of measurements made and information gathered in the field. As stated in Subsection 4.3, information gathered will be recorded. Notes will be permanent, legible, and complete.

The field notes will accomplish the following:

- Provide adequate and complete information that can be understood by someone other than the note taker
- Provide documentation of work completed or data gathered

The surveyor is encouraged to use notebook space liberally in recording necessary data. Explanatory remarks are encouraged to clarify the field procedures and provide added details. Field sketches are also very useful and

will be used freely. Two important aspects of each survey to be addressed in the field notes are as follows:

- ***Starting and ending basis of the survey*** - The surveyor will explain and document the starting and ending points of their survey. This applies to both horizontal and vertical control. This will require a paragraph of explanation and sketches and/or cross references to data in notes of previous surveys.
- ***Clear indication of final results and checking procedures*** - The final results and checks will be plainly indicated. Erasures will not be used as they raise uncertainties about the reliability of the data. Alterations, additions, revisions, reductions, or comments added to field notes will be written in colored ink to indicate that such information is not part of the original field record. The person making such notations will initial and date each page so affected.

The following is a checklist of information to include in the notebook:

- Date
- Names of survey crew members
- Condition of weather, observed temperatures, relative wind speed, and barometric pressure if an electronic distance meter (*e.g.*, a total station) is to be used
- Equipment used, listing the serial number or other identification
- Location of survey by section description or other legal parcel identification
- Project and element number
- North arrow
- Description of all monuments found
- Measurements as made (slope distance and vertical angles, temperature, taping, horizontal angles, etc.)
- Corrected distances and angles
- Description of monuments set
- Relation of possession or encroachments to survey lines
- Outline or sketch of major traverse or property boundary

4.7 Decontamination

4.7.1 Personnel

Personal decontamination procedures are provided in the Health and Safety Plan for Riverdale Chemical Company.

4.7.2 Sample Containers

Chemical Analyses

Sample containers for chemical analyses will be provided by the analytical laboratories as described in Section 4 of this FSAP and in the QAPP, included as Appendix A to the Workplan.

Physical Analyses

No special decontamination procedures are required for containers used in the collection of samples for physical analyses. The containers should be visually free of soil. If soil is present, the container can be either rinsed with potable or deionized water before use or discarded and replaced with a new container.

4.7.3 Drilling Equipment

Decontamination Area

A decontamination area will be located south of the raw material storage area. A temporary impermeable containment will be established in the area. The containment will include provision for the collection of wastewater and soil that is generated by the decontamination process. Management of these investigation-derived wastes (IDW) is described in Section 4 of the FSAP. The area will be equipped with a high-pressure hot-water spray washer and a tank or drums for the storage of water used in decontamination.

Decontamination Procedures

All downhole drilling equipment will be decontaminated prior to the start of drilling at each proposed location and will be decontaminated at the end of the field investigation. This equipment includes, but is not limited to, items such as hollow-stemmed augers, drilling rods, soil samplers, surge blocks and rods, and pumps. The OSC (or designee) will be responsible for ensuring that all downhole equipment is subjected to decontamination.

Decontamination will be by high-pressure hot-water washing within the decontamination area. The OSC (or designee) will be responsible for checking that the equipment is properly cleaned.

The aboveground portions of drill rigs and other support vehicles will, at a minimum, be decontaminated before the start, and at the end, of the field investigation. If the drilling vehicles come into contact with subsurface soil, the vehicle will be decontaminated before beginning work at a new boring location.

4.7.4 Sampling and Field Measurement Equipment

Soil Samplers

Soil sampling equipment will be decontaminated as described in Section 4 at the start and end of the field investigation and before each new boring location. The samplers will be scrubbed with a brush using a non-phosphate detergent and rinsed in potable water before each soil sample is collected. Soil and water generated by this process will be managed as IDW, as described in Section 4 of this FSAP.

4.8 Investigation-derived Waste Management

4.8.1 Personal Protective Equipment and Waste

Procedures for the management of personal protective equipment, decontamination fluids, and other wastes produced through implementation of the HSP (included as Appendix C to the Workplan).

4.8.2 Equipment Decontamination Water

Waters generated by equipment will be collected and stored on site.

4.8.3 Boring Soil

Soil generated by boring will be collected in containers and staged at the decontamination area described in Section 4 of this FSAP. The soil from borings will be combined with soil generated from equipment decontamination, analyzed by the TCLP, and managed as described in Section 4.

SECTION 5

Section 5
References

IT Corporation. 1998. Draft Feasibility Study Work Plan. Riverdale Chemical Company. Chicago Heights, Illinois.

IT Corporation. 1998. Hydraulic Conductivity Testing of Soils. Riverdale Chemical Company. Chicago Heights, Illinois. April 1998.

RMT, Inc. 2000. Feasibility Study Report, Riverdale Chemical Company. Chicago Heights, Illinois. February 23, 2000.

USEPA. 1984. Administrative Order of Consent for Immediate Response Measures. September 28, 1984.

USEPA. 1985. Administrative Order of Consent for Remedial Investigation/Feasibility Study. Riverdale Chemical Company. Chicago Heights, Illinois. February 27, 1985.

USEPA. 1996. ATSDR Record of Activity. Riverdale Chemical Company. July 29, 1996.

ATTACHMENT A

Attachment A
Example Forms

Table of Contents

General Notes

RMT INC

FIELD WORK TITLE PAGE

PROJECT NAME: _____

PROJECT NUMBER: _____

LOCATION: _____

DATES OF FIELD WORK: _____

PURPOSE OF FIELD WORK: _____

WORK PERFORMED BY: _____

Signed _____ Date _____ QC'd By _____ Date _____

RMT INC.

GENERAL NOTES

PROJECT NAME: _____ DATE: _____

PROJECT NUMBER: _____ AUTHOR: _____

TIME ARRIVED ON-SITE: _____ TIME LEFT SITE: _____

WEATHER:

WORK/SAMPLING PERFORMED:

PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN:

COMMUNICATIONS:

Name/Representing:

Subject/Comments:

QC'd By: _____

General Notes - Equipment Summary

RMT INC.

GENERAL NOTES - EQUIPMENT SUMMARY

WATER LEVEL MEASUREMENTS WERE COLLECTED WITH:

Name and Model Number of Instrument _____ Serial Number (if applicable) _____

DEPTH TO BOTTOM OF WELL MEASUREMENTS WERE COLLECTED WITH:

Name and Model Number _____ Serial Number (if applicable) _____

PURGING METHOD:

Name and Model Number of Pump or Type of Bailer _____ Serial Number (if applicable) _____

PURGE WATER DISPOSAL METHOD:

_____

SAMPLING METHOD:

Name and Model Number of Pump or Type of Bailer _____ Serial Number (if applicable) _____

pH/CONDUCTIVITY: *See meter calibration logs

FILTRATION METHOD:

Name and Model Number of Device _____ Serial Number (if applicable) _____

Filter Type _____ Tubing Type _____

DECONTAMINATION AND FIELD BLANK WATER SOURCE:

Potable Water Source (if applicable) _____ DI Water Source _____

Signed _____ Date _____ QC'd By _____ Date _____

Log of Test Boring

LOG OF TEST BORING

BORING NO.:	
SHEET	of
PROJECT:	PROJECT NO.:
LOCATION:	SURFACE ELEVATION:
DRILLED BY:	DATE STARTED: / DATE COMPLETED:
LOGGED BY:	CHECKED BY:

SAMPLING NOTES				ELEV. (ft.)	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
NO.	TYPE	RECOVERY BLOWS	RECOVERY %			

NOTES	WATER LEVEL OBSERVATIONS			
DRILLING METHODS:	FIRST OCCURENCE:			
	DATE/TIME			
BOREHOLE DIAMETER:	DEPTH TO WATER			
DRILL RIG:	DEPTH TO CAVE IN			

F-203A (R 09-87)

RMT

LOG OF TEST BORING

BORING NO.:

SHEET of

PROJECT:

PROJECT NO.:

LOCATION:

SURFACE ELEVATION:

SAMPLING NOTES				ELEV. (ft.)	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
NO.	TYPE	RECOVERY BLOWS	RECOVERY %			

F-2038 (R 09-87)

General Notes – Boring Log Unified Soil Classification System (USCS)

GENERAL NOTES - BORING LOG
UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

Sample Description Format

Group Name (Group Symbol), Percent and Range of Particle Sizes, Plasticity, Color, Odor, Moisture, Density/Consistency, Additional Comments, Geologic Origin (Stratigraphic Unit)

GRAIN SIZE TERMINOLOGY

Soil Fraction		Particle Size	U.S. Standard Sieve Size
Boulders		Larger than 12"	Larger than 12"
Cobbles		3" to 12"	3" to 12"
Gravel:	Coarse	3/4" to 3"	3/4" to 3"
	Fine	4.75 mm to 3/4"	no. 4 to 3/4"
Sand:	Coarse	2.00 mm to 4.75 mm	no. 10 to no. 4
	Medium	0.42 mm to 2.00 mm	no. 40 to no. 10
	Fine	0.075 mm to 0.42 mm	no. 200 to no. 40
Silt		0.005 mm to 0.075 mm	Smaller than no. 200
Clay		Smaller than 0.005 mm	Smaller than no. 200

Plasticity characteristics differentiate between silt and clay

PERCENTAGES OF GRAVEL RELATIVE PROPORTIONS OF COHESIONLESS SOILS

Sand and Fines (Optional)

Proportional Term	Defining Range By Percentage of Weight
Trace	0% - 5%
Few	5% - 10%
Little	15% - 25%
Some	30% - 45%
Mostly	50% - 100%

RELATIVE DENSITY CONSISTENCY

NONCOHESIVE			COHESIVE	
		N Value		Pp-tons/sq.ft
			Very Soft	0.0 to 0.25
Very Loose	0-4	0-4	Soft	0.25 to 0.50
Loose	4-10	4-8	Medium Stiff	0.50 to 1.0
Medium Dense	10-30	8-15	Stiff	1.0 to 2.0
Dense	30-50	15-30	Very Stiff	2.0 to 4.0
Very Dense	Over 50	Over 30	Hard	Over 4.0

The penetration resistance, N, is the summation of the number of blows required to effect two successive 6" penetrations of the 2" split-barrel sampler. The sampler is driven with a 140 lb. weight falling 30" and is seated to a depth of 6" before commencing the standard penetration test.

ABBREVIATIONS
Drilling and Sampling

HSA	-	Hollow-Stem Auger
SSA	-	Solid-Stem Auger
HA	-	Hand Auger
CWR	-	Clear-Water Rotary
MR	-	Mud Rotary
AR	-	Air Rotary
SC	-	Spin-Casing
DC	-	Drive-Casing
SS	-	2" Split-Barrel Sampler
SS 3	-	3" Split-Barrel Sampler
ST	-	2" Thin-Walled Tube Sampler
ST 3	-	3" Thin-Walled Tube Sampler
PS	-	Piston Sampler
AS	-	Auger Cuttings Sample
RS	-	Rotary Cuttings Sample
SC	-	Soil Core
RC	-	Rock Core

ADDITIONAL INFORMATION REQUIREMENTS

- Review Department of Natural Resources Instructions for Wisconsin Logs
- Project/Boring Identification
- Contractor/Crew Identification
- Date and Time of Contractor Operations
- Equipment Identification
- Sample Identification
- Sampled Interval
- Recovery
- Sample Chain-of-Custody if Required
- Well Construction
  - Materials
  - Screen Length/Slot-Size
  - Screen Depth
  - Filter-Pack Depth
  - All Seal Depth(s)
  - Stick-up Above Ground
- Problems Encountered in Drilling or Installation and Resolution

SAMPLE DESCRIPTION ABBREVIATIONS

br.	Brown	ls.	Limestone
gr.	Gray	sh.	Shale
yel.	Yellow	qtz.	Quartz
lt.	Light	dol.	Dolomite
dk.	Dark	ss.	Sandstone
blk.	Black	ig.	Igneous
gvl.	Gravel	meta.	Metamorphic
sd.	Sand		
si.	Silt		
cl.	Clay		
f.	Fine		
m.	Medium		
c.	Coarse		
v.	Very		
tr.	Trace		
ltl.	Little		

Unified Soil Classification System
(Visual-Manual Procedure)

RMT INC.

UNIFIED SOIL CLASSIFICATION SYSTEM (VISUAL-MANUAL PROCEDURE)

F-245A (12/92-R2)

FLOW CHART FOR IDENTIFYING INORGANIC FINE-GRAINED SOIL (50% OR MORE FINES)

GROUP SYMBOL				GROUP NAME
CL	<30% plus No. 200	<15% plus No. 200		Lean clay
		15-25% plus No. 200	% sand ≥% gravel	Lean clay with sand
			% sand <% gravel	Lean clay with gravel
	≥30% plus No. 200	% sand ≥% gravel	<15% gravel	Sandy lean clay
			≥15% gravel	Sandy lean clay with gravel
		% sand <% gravel	<15% sand	Gravelly lean clay
			≥15% sand	Gravelly lean clay with sand
ML	<30% plus No. 200	<15% plus No. 200		Silt
		15-25% plus No. 200	% sand ≥% gravel	Silt with sand
			% sand <% gravel	Silt with gravel
	≥30% plus No. 200	% sand ≥% gravel	<15% gravel	Sandy silt
			≥15% gravel	Sandy silt with gravel
		% sand <% gravel	<15% sand	Gravelly silt
			≥15% sand	Gravelly silt with sand
CH	<30% plus No. 200	<15% plus No. 200		Fat clay
		15-25% plus No. 200	% sand ≥% gravel	Fat clay with sand
			% sand <% gravel	Fat clay with gravel
	≥30% plus No. 200	% sand ≥% gravel	<15% gravel	Sandy fat clay
			≥15% gravel	Sandy fat clay with gravel
		% sand <% gravel	<15% sand	Gravelly fat clay
			≥15% sand	Gravelly fat clay with sand
MH	<30% plus No. 200	<15% plus No. 200		Elastic silt
		15-25% plus No. 200	% sand ≥% gravel	Elastic silt with sand
			% sand <% gravel	Elastic silt with gravel
	≥30% plus No. 200	% sand ≥% gravel	<15% gravel	Sandy elastic silt
			≥15% gravel	Sandy elastic silt with gravel
		% sand <% gravel	<15% sand	Gravelly elastic silt
			≥15% sand	Gravelly elastic silt with sand

FLOW CHART FOR IDENTIFYING ORGANIC FINE-GRAINED SOIL (50% OR MORE FINES)

OL/OH	<30% plus No. 200	<15% plus No. 200		Organic soil
		15-25% plus No. 200	% sand ≥% gravel	Organic soil with sand
			% sand <% gravel	Organic soil with gravel
	≥30% plus No. 200	% sand ≥% gravel	<15% gravel	Sand organic soil
			≥15% gravel	Sandy organic soil with gravel
		% sand <% gravel	<15% sand	Gravelly organic soil
			≥15% sand	Gravelly organic soil with sand

FLOW CHART FOR IDENTIFYING COARSE-GRAINED SOIL (LESS THAN 50% FINES)

				GROUP SYMBOL		GROUP NAME
GRAVEL % gravel > % sand	≤5% fines	Well graded		GW	<15% sand	Well graded gravel
					≥15% sand	Well graded gravel with sand
		Poorly graded		GP	<15% sand	Poorly graded gravel
					≥15% sand	Poorly graded gravel with sand
	10% fines	Well graded	fines = ML or MH	GW-GM	<15% sand	Well graded gravel with silt
					≥15% sand	Well graded gravel with silt and sand
			fines = CL or CH	GW-GC	<15% sand	Well graded gravel with clay
					≥15% sand	Well graded gravel with clay and sand
		Poorly graded	fines = ML or MH	GP-GM	<15% sand	Poorly graded gravel with silt
					≥15% sand	Poorly graded gravel with silt and sand
			fines = CL or CH	GP-GC	<15% sand	Poorly graded gravel with clay
					≥15% sand	Poorly graded gravel with clay and sand
	≥15% fines		fines = ML or MH	GM	<15% sand	Silty gravel
					≥15% sand	Silty gravel with sand
			fines = CL or CH	GC	<15% sand	Clayey gravel
					≥15% sand	Clayey gravel with sand
SAND % sand ≥ % gravel	≤5% fines	Well graded		SW	<15% gravel	Well graded sand
					≥15% gravel	Well graded sand with gravel
		Poorly graded		SP	<15% gravel	Poorly graded sand
					≥15% gravel	Poorly graded sand with gravel
	10% fines	Well graded	fines = ML or MH	SW-SM	<15% gravel	Well graded sand with silt
					≥15% gravel	Well graded sand with silt and gravel
			fines = CL or CH	SW-SC	<15% gravel	Well graded sand with clay
					≥15% gravel	Well graded sand with clay and gravel
		Poorly graded	fines = ML or MH	SP-SM	<15% gravel	Poorly graded sand with silt
					≥15% gravel	Poorly graded sand with silt and gravel
			fines = CL or CH	SP-SC	<15% gravel	Poorly graded sand with clay
					≥15% gravel	Poorly graded sand with clay and gravel
	≥15% fines		fines = ML or MH	SM	<15% gravel	Silty sand
					≥15% gravel	Silty sand with gravel
			fines = CL or CH	SC	<15% gravel	Clayey sand
					≥15% gravel	Clayey sand with gravel

NOTE: Percentages are based on estimating amounts of fines, sand, and gravel to the nearest 5%.

SOURCE: ASTM Designation D2488-90

Severn Trent Laboratories Sample Custody Procedures

3.0 SAMPLE CUSTODY

3.1 SAMPLE RECEIVING

Severn Trent Laboratories chain-of-custody procedures are based upon the National Environmental Information Center (NEIC) policies and procedures (EPA-330/9-78-001-R). A sample custodian is responsible for receiving samples, completing chain-of-custody records, determining and documenting the condition of samples received, logging samples into the Analytical Information Management System (AIMS®), and storing samples in appropriate limited-access storage areas. Chain-of-custody documentation is also maintained for the transfer of samples between Severn Trent Laboratories, and for shipment of samples to subcontracted laboratories.

Upon sample receipt, an inventory of shipment contents is compared with the chain-of-custody record, and any discrepancies, including broken containers, inappropriate container materials or preservatives, headspace in volatile organics samples, and incorrect or unclear sample identification, are documented and communicated to the appropriate project manager.

The temperature of samples shipped under refrigeration is measured using an infrared measuring gun, a thermometer inserted in a temperature blank bottle, if included in the cooler, or a thermometer placed in the cooler adjacent to sample containers. Any deviations from a range of 4 ± 2° C, or the range required by the applicable program, are documented and communicated to the appropriate project manager.

The pH of each acid- or base-preserved sample is measured and documented upon sample receipt, with the exception of volatile organics samples, which are tested for pH at the time of analysis. If sample pH is not within method-specified limits, the project manager is notified of the discrepancy; the client is then contacted for further instructions, which may include preservation of the sample by the laboratory.

After completion of the sample shipment inspection, temperature and pH verifications, and resolution of any discrepancies, samples are logged into AIMS® by the sample custodian for a specific project task created by the appropriate project manager. The AIMS® sample login procedure records pertinent information for each sample, including:

- Client name
- Project number
- Task number
- Purchase order number
- Airbill number
- Chain-of-custody number
- Number of samples
- Sample matrix type
- Date and time of sampling
- Date and time of receipt by lab
- Client sample identification
- Any comments regarding special instructions or discrepancies

AIMS® then assigns a unique laboratory identification number to each sample, which becomes the primary means of tracking each sample within the laboratory. Each sample container is labeled with the lab ID number and client identification and placed into secure storage areas.

3.2 SAMPLE STORAGE

Samples are stored in secure limited-access areas. Walk-in coolers or refrigerators are maintained at 4 ± 2° C or as required by the applicable regulatory program. The temperatures of all refrigerated storage areas are monitored

and recorded a minimum of once per day, using a thermometer verified for accuracy against an NIST-traceable calibrated thermometer. Deviations of temperature from the applicable range require corrective action, including moving samples to another storage location if necessary.

3.3 SAMPLE CONTROL

Sample custody is defined by this document as when:

- It is in someone's actual possession,
- It is in someone's view after being in their physical possession,
- It was in someone's possession and then locked, sealed, or secured in a manner which prevents unsuspected tampering, or
- It is placed in a designated and secured area.

Samples are removed from storage areas by the sample custodian or analysts and transported to secure laboratory areas for analysis. Access to the laboratory and sample storage areas is restricted to laboratory personnel and escorted visitors only; all areas of the laboratory are therefore considered secure. If required by the applicable regulatory program, internal chain-of-custody is documented in a log by the person moving the samples between laboratory and storage areas.

3.4 SAMPLE DISPOSAL

A minimum of thirty days following completion of the project, or after a period of time specified by any applicable project requirements, sample disposal is performed in compliance with federal, state, and local regulations. Alternatively, samples may be returned to the client by mutual agreement. All available data for each sample, including laboratory analysis results and any information provided by the client, are reviewed before sample disposal.

The laboratory data for soil samples analyzed for polychlorinated biphenyls (PCBs) is assessed to determine if the samples must be classified as toxic waste under the Toxic Substances Control Act (TSCA). TSCA PCB wastes are segregated from other samples in a designated waste drum. Other solid samples are composited in a separate drum, the contents of which are analyzed for Toxicity Characteristics Leaching Procedure (TCLP) parameters and reactivity, corrosivity, and ignitability characteristics, in order to classify the waste as hazardous or non-hazardous.

Liquid samples known or suspected of being hazardous are removed from the containers and composited in appropriate waste drums. Aqueous samples determined to be non-hazardous may be disposed of through the laboratory sewer system unless prohibited by the client or applicable project plan.

Solid samples may be removed from the containers or sample containers may be crushed and composited along with the samples. Liquid sample containers are typically emptied and disposed of separately from the samples. All sample labels are either destroyed or obliterated of client information when disposing of sample containers.

After each sample waste drum has been categorized as non-hazardous, hazardous, or TSCA waste, the waste is disposed of accordingly, using an appropriate waste contractor for each waste type. The laboratory maintains all records of sample waste disposal, including manifests.

Chain of Custody Record

Sample Custody Procedures

The laboratory receives and signs a Chain of Custody (COC) Record with all field samples that require a chain of custody. Upon sample receipt, a physical inventory of the samples is done and compared to the samples listed on the COC. Any discrepancies, such as mis-labeled samples, broken or damaged containers, insufficient sample size, etc., will be documented on the COC and communicated to the Project Manager.

All pertinent project and sample information is then transferred to a laboratory Work Order Form, and the requested analysis is checked off in the appropriate boxes. A copy of the COC will be attached to the Work Order for future reference, if needed. Generally, testing on the samples submitted will proceed the same day that they are received. If testing is temporarily delayed, the samples will be temporarily stored in a limited access area of the laboratory. Any residual sample material remaining after testing will be returned to temporary storage until the Project Manager approves disposal.

STL
Committed To *Your* Success

Report To:	Bill To:	*Internal Use Only*
Contact:	Contact:	
Company:	Company:	
Address:	Address:	
Phone:	Phone:	
Fax:	Fax:	
E-Mail:	PO#: Quote:	

Sampler Name:	Signature:
Project Name:	Project Number:
Project Location:	Date Required:

STL Sample No.	Client Sample ID	Sampling Date	Sampling Time	MATRIX	COMP / GRAB																Additional Analyses / Remarks

RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
1.				2.			
3.				4.			
5.				6.			

Matrix Key
- WW = Wastewater
- W = Water
- S = Soil
- SL = Sludge
- MS = Miscellaneous Solids
- OL = Oil
- A = Air
- O = _____

Container Key
1. Plastic
2. VOA Vial
3. Sterile Plastic
4. Amber Glass
5. Widemouth Glass
6. Other

—

Preservative Key
1. HCl, Cool to 4°
2. H_2SO_4, Cool to 4°
3. HNO_3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn Acetate, Cool to 4°
6. Cool to 4°
7. None

COMMENTS:

Courier:

Bill of Lading:

3

STL COC 10/98 Rev 0

Chain of Custody Record

Quanterra

QUA-4124

Client	Project Manager	Date	Chain Of Custody Number 14043
Address	Telephone Number (Area Code)/Fax Number	Lab Number	Page _____ of _____
City / State / Zip Code	Site Contact		
Project Name	Carrier/Waybill Number		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description	Date	Time	Sample Type	Total Volume	Containers Type	Containers No.	Preservative	Condition on Receipt	Analysis

Special Instructions

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Turn Around Time Required
☐ Normal ☐ Rush

QC Level
☐ I ☐ II ☐ III

Project Specific (Specify)

	Date	Time		Date	Time
1. Relinquished By			1. Received By		
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments

DISTRIBUTION: WHITE - Stays with Sample; CANARY - Returned to Client with Report; PINK - Field Copy

APPENDIX C

Integrated
Environmental
Solutions

222 South Riverside Plaza
Suite 820
Chicago, IL 60606
Telephone: 312-575-0200
Fax: 312-575-0300

APPENDIX C

HEALTH & SAFETY PLAN
FOR THE
PHASE 1 REMOVAL ACTION WORKPLAN

RIVERDALE CHEMICAL COMPANY

Prepared For
Riverdale Chemical Company
Chicago Heights, Illinois

Prepared By
RMT, Inc.
Chicago, Illinois

September 2000

Table of Contents

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Preface

This Health and Safety Plan (HSP) for the Riverdale Chemical Company in Chicago Heights, Illinois, was developed for removal action work to be performed. It has been prepared for use by RMT, Inc. employees to meet the requirements of Occupational Health and Safety Administration Standards under 29 CFR 1910 and 1926 and related guidance. This document will be used as the minimum health and safety requirements for all contractors performing work associated with the removal actions.

Acronyms

AOC	Administrative Order by Consent
ATSDR	Agency for Toxic Substances and Disease Registry
BN/As	Base neutral/acid extractables
CHTT	Chicago Heights Terminal Transfer Railroad
EE/CA	Engineering Evaluation/Cost Analysis
FIT	Field Investigation Team
FS	Feasibility study
HSC	Health and Safety Coordinator
HSP	Health and Safety Plan
HSR	Health and Safety Representative
IEPA	Illinois Environmental Protection Agency
IRM	Interim Remedial Measure
IT	IT Corporation
MSL	Mean Sea Level
OSHA	Occupational Safety and Health Administration
PHE	Public Health Evaluation
PM	Project Manager
RD/RA	Remedial design/remedial action
RI	Remedial investigation
RI/FS	Remedial investigation/feasibility study
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
USEPA	United States Environmental Protection Agency

SECTION 1

Section 1
Introduction

1.1 Background

1.1.1 Site Description

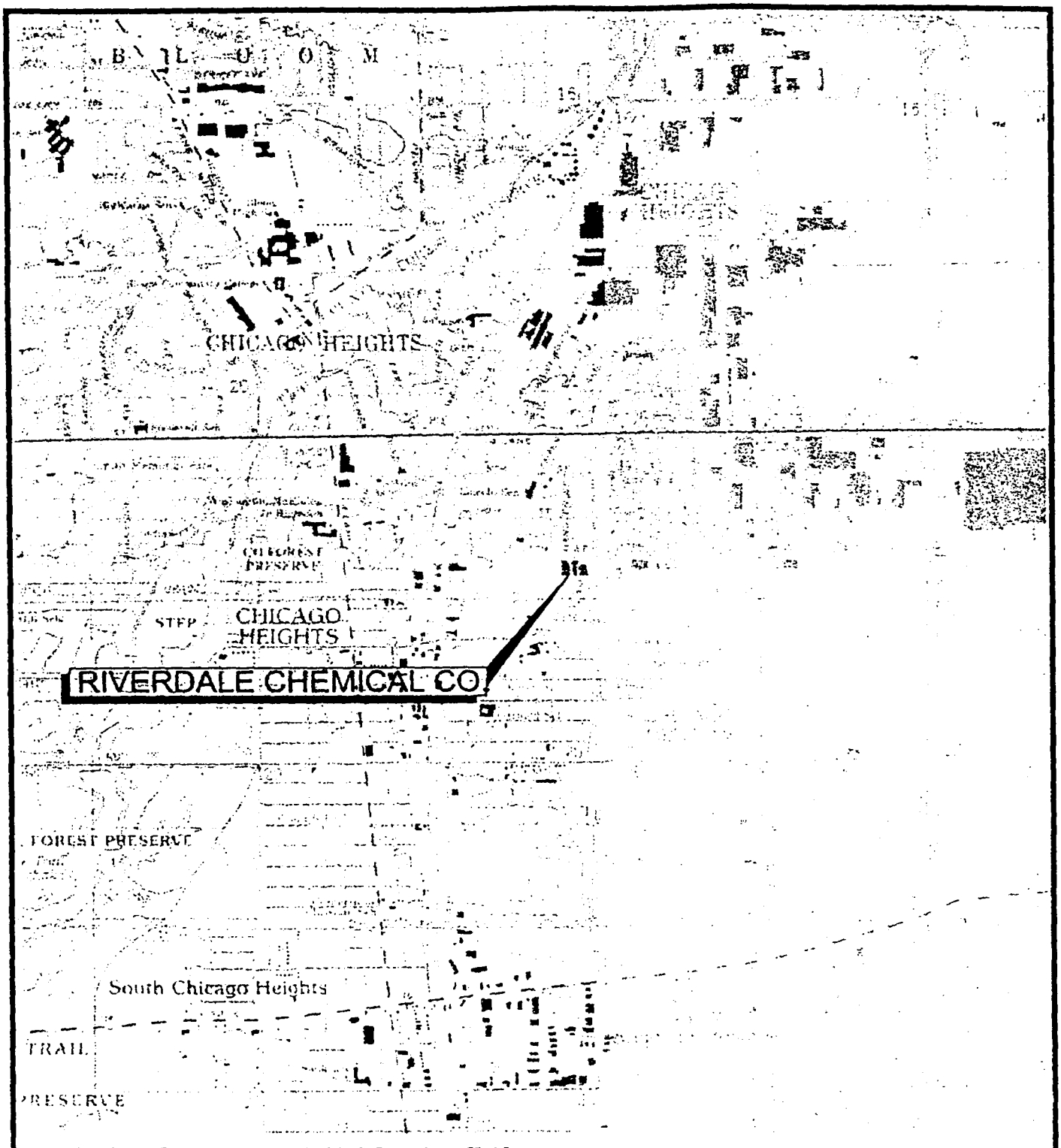
The Riverdale site is approximately 5 acres and lies within the industrialized area zoned for heavy industry located in the southeastern portion of the City of Chicago Heights. The site is bounded on the north by the Chicago Heights Terminal Transfer Railroad (CHTT) tracks and East 17th Street, on the east by the Baltimore and Ohio Railroad tracks, on the south by the Michigan Central Railroad tracks, and on the west by a vacant lot (Figure 1). Low-density residential housing lies across East 17th Street from the site. The site is fenced on all sides by a 6-foot-high cyclone fence with a barbed wire header and has 24-hour security. The site is an active manufacturing facility used by Riverdale for the formulation, packaging, and shipment of agricultural and turf products.

Structures on the site include three main buildings, a smaller ancillary building, and an aboveground storage tank area (Figure 2). Building No. 1 is located at the west side of the site and is used as a Finished Goods Warehouse. Building No. 2, Manufacturing Building, contains the administrative offices, laboratory, and some manufacturing and packaging operations. Building No. 3 is used for raw material storage and manufacturing. Packaging supplies are contained in Building No. 4.

1.1.2 Site History and Regulatory Actions

The Riverdale Chemical Company site is an active facility used for the formulation and packaging of various agricultural and turf chemicals. Riverdale has been conducting an RI/FS under an AOC at the site since the 1980s.

In April 1984, a site study was conducted by the Field Investigation Team (FIT) as part of the National Dioxin Test Strategy Program. This study indicated the presence of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and other pesticides in the surface soil at the site. Given the results of the FIT study, Riverdale completed an Interim Remedial Measure (IRM) to control exposure to contaminants under an AOC between the USEPA and Riverdale dated September 28, 1984. The IRM required placement of a geotextile fabric over the area containing the highest concentrations of contaminated soil



SOURCE: U.S.G.S. 7.5 MIN. HARVEY, STEGER, DYER & CALUMET CITY ILL.-IND. QUAD SHEETS (1990, 1991, 1993)

FIGURE 1
SITE LOCATION MAP

RIVERDALE CHEMICAL COMPANY
CHICAGO HEIGHTS, IL

SCALE IN FEET
0 1000 2000

N

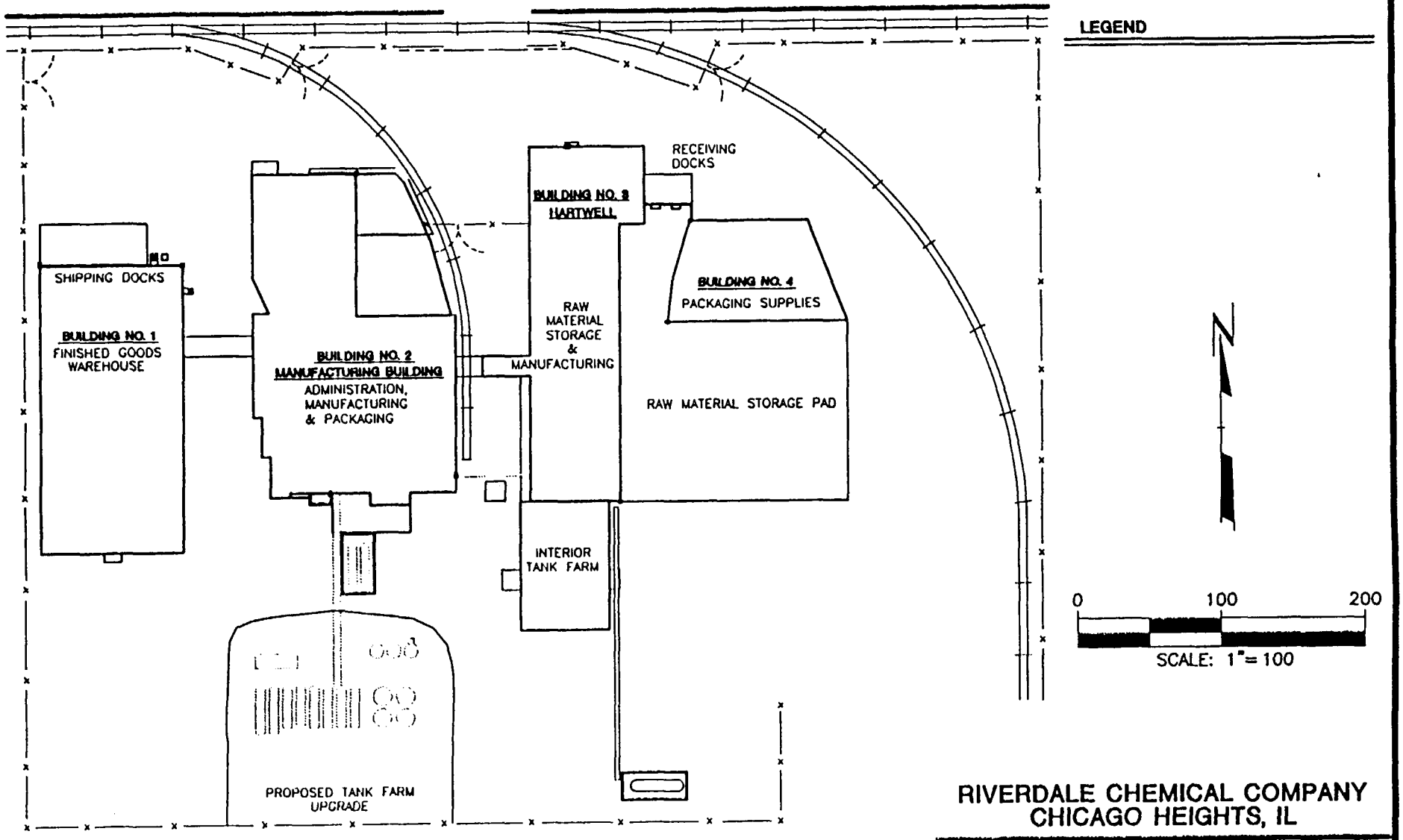
RMT INC.

DWN. BY:	DAY
APPROVED BY:	INITIALS
DATE:	10/27/99
PROJ #	4962.01
FILE #	H&S_PLAN

PLOT DATA
Drawing Name: H&S_PLAN

PLOT DATA
Drawing Name: J:\04962\01\49620128.dwg
Operator Name: MECHAMB
Scale: 1"=100'
Dwg Size: 252335 Bytes
Attached Xref's: No xref's Attached.
Plot Time: 2:19.3201 PM
Plot Date: Tuesday, October 12, 1999

RMT COMPUTER AIDED DESIGN & DRAFTING



RIVERDALE CHEMICAL COMPANY
CHICAGO HEIGHTS, IL

RMT

DWN. BY:	MECHAMB
APPROVED BY:	
DATE:	OCTOBER 1999
PROJ. #	4962.01
FILE #	49620128.DWG

FIGURE 2

(approximately 19,600-square foot area) along with a barrier layer of 8 to 10 inches of crushed limestone, which is regularly inspected and maintained.

Riverdale entered into a separate AOC on February 27, 1985, to conduct the RI/FS at the site. Field work was conducted by IT between October 1985 and November 1986. The Final RI Report was submitted to the USEPA in April 1988. Riverdale continues to maintain the crushed limestone barrier along with other requirements of the IRM AOC.

A fire occurred at the facility on July 2, 1992, when a lighting strike apparently triggered a fire at the warehouse (Building 4). The warehouse contained various fungicide, herbicide, and insecticide products, including the active ingredients 2, 4, -D, Dicamba, 2, 4, -DP, MCPA, MCPP, and oxidizers. These products were stored in the brick construction warehouse on a concrete slab floor. It was estimated that the fire consumed 85 percent of the contents of the warehouse. After the fire was extinguished, the fire residue was contained within the shell of the warehouse, secured with plastic sheeting within a cyclone fence, and permitted for proper disposal. Water used to fight the fire was diverted, through emergency excavation procedures, to a low area north of the warehouse and to a drainage pond southeast of the warehouse. The water was sampled and contained 2, 4, -D up to 420 ppm; MCPA up to 70 ppm; 2, 4, DP up to 17 ppm; MCPP up to 14 ppm; fungicide up to 58 ppm; and dicamba up to 4.1 ppm. With the approval of the USEPA, the Illinois Environmental Protection Agency (IEPA), and the Thorn Creek Basin Sanitary District, the collected water was discharged to the sewer system for treatment.

In 1996, the Agency for Toxic Substances and Disease Registry (ATSDR) conducted a study of the surrounding residential areas at the request of the USEPA. On July 29, 1996, ATSDR issued a report summarizing soil sampling activities performed on May 2, 1996. The conclusion of the report stated that the concentrations of base neutral/acid extractables (BN/As) and organochlorine chemicals detected in the surface soil samples from residential properties adjacent to the site, do not pose a public health hazard. The report recommended no further activities as a result of the soil sampling.

The USEPA contacted Riverdale in December 1996 to discuss finalization of the RI Report. The USEPA provided minor comments to be included prior to approval. Riverdale incorporated the USEPA's comments; and, in addition, revised the RI Report to reflect current site conditions and current guidance. Specifically, the Risk Assessment was revised. Based on the Public Health Evaluation (PHE), the complete human exposure pathway includes industrial worker exposure to surface soil and construction worker exposure to subsurface soil.

In 1998, Riverdale conducted additional limited investigations to provide the USEPA with geological data to support the conclusions of the RI Report. This information was presented in letter reports to the USEPA on March 24, 1998, and April 13, 1998, and was not incorporated into the RI Report or FS Work Plan. The supplemental information developed included a geologic characterization of the subsurface soil, which confirms low hydraulic conductivity (10^{-8} cm/s) of underlying soil.

1.2 Site Characterization

1.2.1 Geology

The site is located on the boundary between the Chicago Lake Plain and the Wheaton Morainal Country units. The Chicago Lake Plain is characterized by a flat surface, underlain by till, which slopes gently toward Lake Michigan. The plain is interrupted by low beach ridges and morainic headlands and islands. The sand dunes common to the Calumet Lacustrine Plain are scarcely recognizable and found only in a few scattered localities.

1.2.2 Topography

The site is relatively flat with a gentle slope to the east. Elevations across the site range from approximately 672 feet above Mean Sea Level (M.S.L.) in the southwestern portion of the site to approximately 664 feet M.S.L. in the eastern portion of the site.

1.2.3 Climatology

Based on the monitoring station at nearby Park Forest, Illinois (5 miles east of the site), summer temperatures averaged between 58°F and 84°F, with 18 days exceeding 90°F during a typical year. Winter temperatures averaged between 13°F and 35°F with 123 days below 32°F and 12 days showing temperatures of 0°F and below for a typical year. Total precipitation averaged 35.2 inches per year, with the site receiving large amounts of precipitation from Lake Michigan in the form of snow squalls.

1.3 Purpose

This site-specific RMT Health and Safety Plan (HSP) has been developed to provide guidelines and procedures intended to protect the health and safety of RMT personnel performing site work. These site activities are defined in detail by the FS Report. The HSP will be reviewed and signed with all RMT field personnel (Appendix A) before site work is begun. Subcontractors will be required to develop and implement their own health and safety plan applicable to their

work on-site in accordance with OSHA requirements, Riverdale Chemical Company requirements, and this HSP.

Specific questions regarding the HSP should be addressed to the RMT Health and Safety Coordinator (HSC). A copy of the HSP will be available for review by site personnel and authorized visitors on request from the site RMT Health and Safety Representative (HSR). A copy of this plan will be provided to contractor/subcontractor personnel for their information and review prior to beginning site work.

The HSP will be reviewed periodically by the HSR and updated as necessary. The plan will also be updated to reflect new or additional site information when this information becomes available.

1.4 Scope

The HSP is aimed specifically at protecting RMT site workers from reasonably foreseeable health and safety hazards arising from the materials found at the Riverdale site as a result of undertaking site work. The procedures presented have been identified based on the analytical results from soil and surface water samples collected during previous site work.

The HSP has been developed in conformance with the following requirements and guidance:

- Occupational Safety and Health Administration (OSHA) Standards, 29 CFR 1910 and 1926, including 29 CFR 1910.120;
- NIOSH/OSHA/USCG/EPA, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, October 1985; and
- USEPA, Standard Operating Safety Guides, June 1992.

The HSP has been developed from technical information available as of May 1999 and is subject to revision as new data and information about the site and site activities become available. The plan shall cover employees performing site field work.

The removal action scope of work at the Riverdale site includes, but may not be limited to, the following tasks:

- Excavation
- Drilling
- Trenching
- Grading
- Placing coarse aggregate

- Placing asphaltic concrete
- Constructing containment structures

1.5 Applicability

The HSP applies to RMT personnel who participate in removal action activities. It contains the minimum requirements necessary to protect on-site personnel from physical, chemical, and other hazards particular to this site that have been identified as of the date of this HSP. More stringent practices than those outlined in this plan may be used, but this plan specifies the minimum practices to which personnel must adhere.

1.6 Responsibilities

The specific duties of those RMT personnel who are responsible for the HSP are as follows:

- *Project Manager (PM)*- Provides an overview of site facilities, equipment, and personnel so that site activities can be conducted in a safe and efficient manner. Obtains permission for site access and coordinate activities with appropriate officials.
- *Health and Safety Coordinator (HSC)* - Develops HSP in conjunction with Project Manager and site HSR; reviews plan periodically and revises plan when new information becomes available; offers technical support to site HSR on health and safety issues; and audits work activities for adherence to HSP.
- *Site Health and Safety Representative (HSR)* - Implements the HSP; advises field team on aspects of on-site health and safety; selects and reviews protective clothing and equipment with input from HSC; monitors the field team members for signs of heat or cold stress; monitors on-site hazards and conditions; knows emergency procedures, evacuation routes, and emergency telephone numbers; and notifies public emergency officials when necessary. Holds weekly health and safety meetings.
- *Other Site Personnel* - Responsible for adhering to the provisions of the site HSP and all OSHA requirements specified in the plan. Safely completes the on-site tasks required. Performs only those tasks that they believe can be done safely, and immediately reports any accidents and/or unsafe condition to the HSR, HSC, or PM.

1.7 Plan Components

The HSP contains information addressing the following areas:

- Health and safety training requirements
- Medical surveillance requirements
- Chemical and physical hazard evaluations and control measures
- Delineation of site work zones and contaminant control

- Decontamination procedures - personal and equipment
- Personal protective equipment and levels of protection
- Work limitations
- Contingency and emergency planning
- Logs, reports, and record keeping
- Safe work practices and safe guards
- Personal hygiene

SECTION 2

Section 2
Health and Safety Training and Medical Surveillance

In order to meet OSHA requirements, all field personnel will participate in health and safety training and a medical surveillance program. Medical monitoring, as described in Section 2.2, is conducted off-site. The Medical Monitoring Equipment is maintained by the medical monitoring provider.

2.1 Health and Safety Training

Prior to beginning field activities, personnel conducting or observing on site activities will be certified in the following health and safety training sessions:

- *Site-specific Health and Safety Plan Review* - During this session, this plan will be reviewed, and any special procedures will be outlined.
- *Health and Safety for Hazardous Waste Site Activities* - This one-time 40-hour training session includes the following elements: regulations, industrial hygiene, toxicology, respiratory protection, physical hazards, noise, temperature extremes, personal protective equipment, medical surveillance, air monitoring equipment, site control and decontamination, standard operating procedures, and confined space entry.
- *8-hour Health and Safety Refresher Training* - This training is required annually after the initial 40-hour training. It serves to review the key aspects of the 40-hour training.
- Site personnel that have had 40-hour training will have had 3 day's actual field experience under the supervision of a trained, experienced supervisor.
- At least one team member will participate in Red Cross first aid and CPR course to more effectively handle physical and medical emergencies that may arise in the field.

Training will also be provided to additional field personnel so that backup personnel can be assigned to perform field activities at the site as the need arises.

Documentation of attendance in training sessions shall be maintained by the RMT Human Resources Department and the Health and Safety Coordinator. Site supervisory/management personnel have had supervisor training under 29 CFR 1910.120(e)(4).

The training requirements in OSHA Standard 29 CFR 1910.120 are to be followed by RMT employees.

2.2 Medical Surveillance

RMT field personnel assigned to the site will be placed in a medical surveillance program prior to performing their first field assignment. Medical surveillance requirements contained in OSHA Standards 29 CFR 1910.134 and 29 CFR 1910.120 will be followed, at a minimum, for RMT personnel who actively perform field sampling activities at the site. This surveillance will include an initial and annual medical examination.

The basic protocol for the medical examination includes the following:

- Health history
- Vital signs and physical examination screen
- Pulmonary function test
- Hematology survey
- Urinalysis
- Heavy metal screen
- Blood chemistry screen
- Vision test
- Hearing test

The initial examination includes an EKG and chest X-ray, in addition to the annual tests listed above. Field personnel assigned to conduct these investigations will have passed the required medical examination as determined by the occupational health physician before entering the project site.

The medical records of personnel are kept on file at the examining physician's clinic. A certificate of medical fitness or specified work restrictions is maintained in the employee's personnel file.

SECTION 3

Section 3
Hazard Evaluation

This section describes the possible hazards associated with the Riverdale site based upon information available as of September 1999. The hazard evaluation has been prepared to meet the requirements of OSHA Standard 1910.120 and as such includes information regarding chemical hazards, physical hazards, and any other relevant site hazards.

Information regarding potential health effects associated with the site-related constituents is based upon maximum estimates of constituent concentrations and exposure parameters designed to err on the side of overestimating the potential occupationally-related risks. The primary potential exposure route would be accidental ingestion from contact with contaminants or contaminated articles. A secondary route of exposure would be inhalation of particles containing contaminants under dusty conditions.

3.1 Waste Description/Characterization

The following chemical information is presented in order to identify the types of materials that may be encountered at the facility.

These chemicals exist mainly in solid form. They may be toxic. Exposure limits for the chemicals of potential concern are presented in Table 3-1 and the tasks, hazardous, and control measures are shown in Table 3-2.

3.2 Physical Hazards

3.2.1 Ticks and Other Insects

The Riverdale site and surrounding areas contain grassy areas and scrub brush. Due to these site features, ticks may be encountered at the site during warm weather. An appropriate tick repellent shall be available on site for personnel use. A detailed discussion of Lyme disease is included as Appendix B.

Site personnel who are allergic to insect stings will have a personal bee sting kit or equivalent onsite for emergency use.

Table 3-1
Exposure Limits
Non-time Critical Removal Action
Riverdale Chemical Company
Chicago Heights, Illinois

SUBSTANCE NAME[1]	MEDIA	KNOWN CONCENTRATION LEVELS PRESENT[1]	POTENTIAL ROUTES OF EXPOSURE	ACGIH TLV®[2]	OSHA PEL[3]
Aldrin	Impacted soil	Max.: 530 mg/kg	Absorption, accidental ingestion and dermal	0.25 mg/m³	0.25 mg/m³
Dieldrin	Impacted soil	Max.: 210 mg/kg	Absorption, accidental ingestion and dermal	0.25 mg/m³	0.25 mg/m³
Chlordane	Impacted soil	Max.: 1100 mg/kg	Absorption, accidental ingestion and dermal	0.5 mg/m³	0.5 mg/m³
4,4'-DDT	Impacted soil	Max.: 33 mg/kg	Absorption, accidental ingestion and dermal	1 mg/m³	1 mg/m³
4,4'-DDE	Impacted soil	Max.: 4.9 mg/kg	Absorption, accidental ingestion and dermal	None established	None established
4,4'-DDD	Impacted soil	Max.: 37 mg/kg	Absorption, accidental ingestion and dermal	None established	None established
Endrin ketone	Impacted soil	Max.: 6.1 mg/kg	Absorption, accidental ingestion and dermal	None established	None established
Heptachlor	Impacted soil	Max.: 68 mg/kg	Absorption, accidental ingestion and dermal	0.05 mg/m³	0.5 mg/m³
2,3,7,8-TCDD	Impacted soil	Max.: 197 mg/kg	Absorption, accidental ingestion and dermal		None established

Notes:

PEL Permissible exposure limit.
ppm Parts per million.
STEL Short-term exposure limit.
TLV® Threshold limit value.
mg/kg Milligrams per kilogram.
mg/m³ Milligrams per cubic meter.

Footnotes:

(1) Source: RI Report, Table 14, Summary of Chemical Analysis.
(2) American Conference of Governmental Hygienists (ACGIH) Threshold Limit Values (TLV®) for 1999.
(3) Permissible Exposure Limits (PELs), U.S. Department of Labor, OSHA.

Table 3-2
Specific Hazard Assessment
Non-Time Critical Removal Action
Riverdale Chemical Company
Chicago Heights, Illinois

HAZARD	CONTROL MEASURE
Impacted soil	Dust control will be used during periods of high winds and remediation activities, when the crushed limestone barrier is removed, and soil is disturbed. Water spray or mist will be used to control blowing soil particles.
Heavy equipment operation	Standard safety procedures will be practiced. Contractor is responsible for safe operation of equipment. Remain in line of sight of operator and out of reach of equipment.
Noise	Hearing protection must be worn if noise level exceeds 85 dBA.
Underground utilities	Underground utilities will be located and marked by contractor.
Overhead utilities	A minimum clearance of 15 feet must be maintained between equipment and overhead lines.
Slippery Ground	Exercise caution

3.2.2 Poison Plants

Poison ivy, poison oak, and poison sumac may be encountered. The key to protection from these urushiol-containing plants is the ability to recognize and avoid the plants that carry the poison. A full discussion of identification, avoidance, and treatment of poison plants is included in Appendix C.

3.2.3 Confined Spaces

It is not anticipated that confined space entry will be required for the field activities. If confined space entry is required, the HSC will prepare a written entry plan and permit. Personnel shall not enter confined spaces without proper training and equipment.

3.2.4 Utilities

Overhead or underground utilities, such as electric, gas, telephone, water, sewer, or drainage, in the project work areas will be located by contractors before the start of operations that require subsurface work or the moving and setup of heavy equipment by the contractor. Information regarding the location of utilities will be kept at the field site for reference.

Overhead utilities must have brush guards installed if they are within any possible reach or swing of any piece of equipment. Power lines must be grounded dead if excavation equipment is operated in the area, subject to the following limitations:

- 15-foot-radius for power lines up to 250,000 volts
- 20-foot-radius for power lines over 250,000 volts

Absolutely no work may be performed within 15 feet of energized lines.

3.2.5 Heavy Equipment

Heavy equipment, such as drilling equipment, used on site is under the control of the subcontractor, who is responsible for maintaining the equipment in good working order and operating it safely. Heavy equipment must have audible backup alarms in working condition. RMT personnel will not work near equipment that they judge to be unsafe because of deterioration, missing parts, obvious defects, or improper operation.

Operation of heavy equipment in areas with steep embankments or unstable ground will be avoided. If it is necessary to operate equipment in these areas, the subcontractor will make provisions for the safety of RMT personnel in the area.

3.2.6 Noise

Hearing protection must be worn by personnel when they are exposed to noise levels above 84 decibels (dBA). Heavy equipment, when in operation, generally results in exposure levels that exceed 84 dBA for personnel working at or near the equipment. A "rule of thumb" to follow is for personnel to wear hearing protection if they must raise their voice to be heard at arm's length. RMT personnel will comply with the RMT Hearing Conservation Program.

3.2.7 Temperature Extremes

Adverse weather conditions are important considerations in planning and conducting site operations. Hot or cold weather can cause physical discomfort, loss of efficiency, and personal injury. The time frame of the removal action will cause site personnel to potentially be exposed to both heat stress and cold stress.

Cold Stress

Persons working outdoors in low temperatures, especially at or below freezing are subject to cold stress. Areas of the body that have a high surface area-to-volume ratio, such as fingers, toes, and ears, are the most susceptible to damage.

Protective clothing generally does not afford protection against cold stress. In many instances, it increases susceptibility due to a reduction in wind chill awareness and exposure to lower than perceived ambient temperatures.

Two factors influence the development of cold injury: ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. A copy of the wind chill chart is included as Table 3-3.

Site personnel will be instructed on the signs and symptoms of cold stress and on the methods of preventing cold-related disorders. In general, the two major cold-related disorders are frostbite and hypothermia.

- *Frostbite* - Sudden blanching of the skin, progressing to skin with a waxy or white appearance that is firm to the touch, while the tissue beneath the skin is resilient. For treatment bring the victim indoors, and warm the areas quickly in warm water. **Never** place frostbitten tissue in hot water as the area will have a reduced heat awareness and such treatment may result in burns. Give the victim a warm drink. The victim must not smoke. Keep the frozen parts in warm water or covered with warm clothes for 30 minutes. The tissue will be very painful as it thaws. Then, elevate the injured area and protect it from physical injury. Do not allow blisters to be broken. Use sterile, soft, dry material to cover the injured areas. Keep the victim warm and get immediate medical care.
- *Hypothermia* - Hypothermia may be of greatest concern in the winter months and may be caused by exposure to freezing or rapidly dropping temperature. The symptoms of systemic hypothermia are usually exhibited in the following stages:
  - Shivering
  - Apathy, listlessness, drowsiness, and (sometimes) rapid cooling of the body to less than 95°F
  - Unconsciousness, glassy stare, slow pulse, and slow respiratory rate
  - Freezing of the extremities
  - For treatment, keep the victim warm and get immediate medical care.

Table 3-3
Windchill Chart
Non-Time Critical Removal Action
Riverdale Chemical Company
Chicago Heights, Illinois

Cooling Power of Wind on Exposed Flesh Expressed as Equivalent Temperature (under calm conditions)*

Estimated Wind Speed (in mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
Wind speeds greater than 40 mph have little additional effect	*LITTLE DANGER* For less than 1 hour with dry skin. Maximum danger of false sense of security.				*INCREASING DANGER* Danger from freezing of exposed flesh within 1 minute.			*GREAT DANGER* Flesh may freeze within 30 seconds.				
	Trenchfoot and immersion foot may occur at any point on this chart.											

* Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.

Each person will watch for personal signs of frostbite and hypothermia as well as signs in team members. If temperatures drop below 20°F, as measured by the wind chill index, thermal clothing shall be required and field activities should be curtailed unless the activity is of an emergency nature.

Heat Stress

The USEPA Standard Operating Safety Guides (1992) recommend that a heat stress monitoring program be implemented when employees are wearing impervious clothing and ambient temperatures are 70°F or above. The frequency of monitoring should increase as temperatures increase, and employees should be monitored after each 2-hour work period when ambient temperatures exceed 85°F. The following paragraph describes the monitoring program recommended by the USEPA that will be used by personnel when ambient temperatures exceed 70°F.

Heart rate (HR) should be measured at the radial pulse for 30 seconds as early as possible in the resting period. Site personnel will measure their pulse at the wrist or side of the neck, with the timed interval provided by another site worker with a watch. The HR at the beginning of the rest period should not exceed 110 beats per minute. If the HR is higher, the next work period should be shortened by 33 percent while the length of the rest period stays the same. If the pulse rate is 110 beats per minute at the beginning of the next rest period, the following work cycle should be shortened by another 33 percent.

All personnel must be instructed on the symptoms of the main heat-related disorders and how to recognize these disorders. These disorders and their symptoms are outlined below:

- *Heat Rash*: Decreased ability to tolerate heat, chafing clothes, raised red vesicles on affected areas
- *Heat Cramps*: Muscle spasms and pain in the extremities and abdomen
- *Heat Exhaustion*: Shallow breathing; pale, cool, moist, clammy skin; profuse sweating; dizziness and lassitude; fainting. Medical attention is warranted.
- *Heat Stroke*: Red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong rapid pulse; coma. *This condition is life-threatening, and immediate medical assistance must be obtained.*

Because it may not always be feasible to follow the work/rest regimen outlined above, site personnel should take a break every 2 hours, at a minimum, and drink adequate amounts of nonalcoholic fluids (electro light fluids). Site personnel will use a watch to determine the appropriate break intervals. An average of one quart of liquid (electro light fluids) per hour is recommended. In addition, the following actions can help reduce heat stress:

- In extremely hot weather, conduct non-emergency response operations in the early morning and evening.
- In hot weather, rotate workers wearing protective clothing.
- Clothing should be permitted to dry during rest periods. Workers who notice skin problems should immediately consult the site HRS.

SECTION 4

Section 4
Site Control Measures

Site control minimizes the transfer of contaminants from and within the project site. Two contamination control methods are the establishment of work zones at the project site and the decontamination of field personnel and equipment.

4.1 Work Zones

Where necessary to prevent the spread of contaminants during the work, field personnel will delineate an exclusion zone, contamination reduction zone, and support zone. The exact locations will be determined at the start of the work dependent on accessibility, traffic, support functions, and other parameters affecting the location selection. The exclusion zones includes the areas of potentially contaminated surface soil. All work zones containing open excavations will be marked by barrier tape and cones. During site operations, the boundaries may be modified and adjusted, as more information becomes available.

4.1.1 Exclusion Zones

The exclusion zones are areas where hazardous substances may be present, based on available information. RMT personnel entering exclusion zones will be required to wear the required protective clothing as outlined in Section 5. The entry and exit points will be established at the periphery of the exclusion zone.

4.1.2 Contamination Reduction Zone

The contamination reduction zone is a transition zone between contaminated, or potentially contaminated, and clean zones. It serves as a buffer to reduce the possibility of the support zone becoming contaminated. The contaminant reduction zone will be just outside of the temporary exclusion zones.

Decontamination procedures, outlined in Subsection 4.2, will be performed in the contamination reduction zones for all source areas. Personnel entering and exiting the contamination reduction zones will have one entry/exit check point at the support boundary of the contamination reduction zone.

Field personnel will wear the required Level D personal protection while working in the contamination reduction zones. Before personnel enter the support zones, they will

remove protective equipment worn in the contamination reduction zones according to the procedures presented in Subsection 4.2.

4.1.3 Support Zone

The support zone is a noncontaminated or clean area. The support zones will be located outside of the contamination reduction zones. Protective clothing is not required in this area. Support equipment, such as clean protective equipment or supplies, will be located in these zones, which will include a support trailer or field vehicle. The location of the support zone and any support facilities will be determined based on the following factors:

- Accessibility
- Support services—electric power supply, roads, drinking water, etc.
- Wind direction

4.2 Decontamination Procedures

Whenever field personnel or equipment leave the exclusion zones, they must follow prescribed decontamination procedures. Protective outer garments will be removed, and placed in disposable plastic bags at the perimeter of the contamination reduction zone. Level D decontamination procedures will be as follows:

- Remove gross soil and sediment from boots and gloves with water and brush.
- Remove outer gloves first, if used. Remove protective coveralls by rolling them inside out from the upper torso to the feet.
- Wash/rinse impervious safety boots as appropriate before removing them when leaving the support zone. After removal, place boots in a plastic bag for transport to the next exclusion zone.
- Remove inner gloves if used.
- Wash and dry your hands before leaving the contamination reduction zone, and place used paper towels in the disposal bag.

If Level C personnel protection is used, decontamination procedures will be as follows:

- Remove gross soil and sediment from boots and gloves with water and brush.
- Remove outer gloves first, if used. Remove protective coveralls by rolling them inside out from the upper torso to the feet.
- Remove respiratory protection, discard cartridges as required.

- Wash/rinse impervious safety boots as appropriate before removing them when leaving the support zone. After removal, place boots in a plastic bag for transport to the next exclusion zone.
- Remove inner gloves if used.
- Wash and dry your hands before leaving the contamination reduction zone, and place used paper towels in the disposal bag.

The plastic bags containing the protective equipment waste materials will be stored on-site in a covered container.

Clean outer garments will be kept accessible to field personnel in an area free from potential contamination in the support zone. Water, soap, and paper towels will be kept in a clean location for both regular clean-up and emergency use.

Equipment Decontaminaton

A temporary impermeable decontamination area will be established in the area. The containment will include provision for the collection of wastewater and soil that is generated by the decontamination process. Management of these investigation-derived wastes (IDW) is described in the FSAP. The area will be equipped with a high-pressure hot-water spray washer and a tank or drums for the storage of water used in decontamination.

All downhole drilling equipment, excavation equipment or other vehicles, as required, will be decontaminated prior to the start of drilling at each proposed location and will be decontaminated at the end of the field investigation. This drilling equipment includes, but is not limited to, items such as hollow-stemmed augers, drilling rods, soil samplers, surge blocks and rods, and pumps. The OSC (or designee) will be responsible for ensuring that all downhole equipment is subjected to decontamination.

Decontamination will be by high-pressure hot-water washing within the decontamination area. The OSC (or designee) will be responsible for checking that the equipment is properly cleaned.

The aboveground portions of drill rigs and other support vehicles will, at a minimum, be decontaminated before the start, and at the end, of the field investigation. If the drilling vehicles come into contact with subsurface soil, the vehicle will be decontaminated before beginning work at a new boring location.

4.3 Other Site Personnel

Other site personnel refers to government employees, nonessential contractor personnel, local community representatives, and any other person not actively involved in the removal action that enter the work zones. Other site personnel entering the facility to observe or participate in field activities must report directly to the HSR upon reaching the source area under investigation.

In order to enter the exclusion zones and the contamination reduction zones, other site personnel must sign a waiver prior to site entry. The Waiver Statement is provided in Appendix A. Upon authorization by the HSR, they may enter the exclusion zones and the contamination reduction zones. All personnel entering the exclusion zone should have the proper training, medical monitoring and PPE. Other site personnel must review the RMT HSP prior to entry and should, as a minimum, follow the guidelines specified in the plan. However, visitors are responsible for providing their own health and safety plan and protective equipment and must accept responsibility for their personal health and safety while on-site as indicated on the waiver. Entry authorization to visitors by the HSR does not constitute acceptance on the part of the HSR, RMT, or Riverdale Chemical Company of responsibility for visitor health and safety plan adequacy or visitor safety.

Other personnel who enter the exclusion zones must follow prescribed decontamination procedures as described in this RMT HSP upon exiting.

If a fire, explosion, or toxic gas/vapor release occurs while visitors are present on site, the visitors will immediately evacuate the area, using the evacuation plan as outlined in Subsection 6.2.

4.4 Work Limitations

The following work limitations will apply to all field personnel working onsite.

- No smoking will be allowed in the exclusion or contamination reduction zones or additional on-site locations identified by RMT.
- No eating, drinking, or chewing gum or tobacco will be allowed in the exclusion or contamination reduction zones.
- Seat belts are required to be used in all moving vehicles.
- All personnel and equipment leaving the exclusion zones must be properly decontaminated prior to leaving the site. Personnel decontamination procedures are described in this document. Equipment decontamination procedures are described in the Field Sampling and Analysis Plan and Section 4.2 of this HSP.

- When possible, on-site work will be limited to daylight hours. If work must be done at night, illumination levels will conform to OSHA Construction Standard 29 CFR 1926.56 and OSHA 29 CFR 1910.120.
- Work will be suspended if weather conditions are; (1) significantly windy and dry, causing visable levels of potentially contaminated particulates to become airborne; or, (2) if lightning and other storm conditions threaten worker safety. As described in Table 3-2 of this HSP, engineering controls, such as water, will be used to control blowing soil particles.
- If work is suspended, the type of monitoring equipment which may be utilized, if necessary, may include an ultraviolet photoionization detector (HNU) or airborne particulate sampler.

4.5 Site Communication

Two communication systems should be established during hazardous waste operations; an internal communication among personnel on-site, and an external communication between on-site and off-site personnel.

Internal communications at site are to:

- Alert personnel to emergencies
- Convey safety information (e.g., amount of time left in air tanks, heat stress check, etc.)
- Communicate changes in work to be performed
- Maintain site control

Often at a site, communications can be impeded by background noise and the use of personal protective equipment. For communications to be effective, commands must be pre-arranged. In addition, audio or visual cues can aid in conveying the message. Some common internal communication devices are: two-way radios, noisemakers (*e.g.*, bells, whistles, compressed air horns, etc.), and visual signals (*e.g.*, flags, hand signals, and lights). Radios used in the Exclusion Zone must be intrinsically safe and not capable of sparking.

An external communication system between on-site and off-site personnel is necessary to:

- Report to management
- Coordinate emergency response
- Maintain contact with essential off-site personnel

The primary means of external communication is the telephone. If a telephone is not present at the site, all team members must know where the nearest telephone is located. The correct change and necessary telephone numbers should be readily available.

Section 5
Personal Protective Equipment

5.1 Introduction

Protective clothing must be worn whenever the potential exists for employees to come in contact with or to be exposed to affected material. Worker personal protective equipment (PPE) for intrusive activities will begin at modified Level D protection based on the most current information available on potential health and safety hazards at the site. Another means of protection includes employing work limitations.

5.2 Levels of Protection

Two levels of protection are specified in this HSP. A modified Level D will be the standard level of protection applied throughout the field activities. Levels of protection higher than D (*e.g.*, C) are not anticipated to be needed at this site. As noted elsewhere, should site conditions indicate that Level D protection is not adequate, all work will stop and site conditions and personal protection will be reevaluated.

Intrusive activities are defined as excavating test pits and trenches, conformance sampling of soil, and general grading. Modified level D protection will consist of the following:

- Steel-toed, impervious work boots;
- Hard hat (when overhead hazards exist or heavy equipment is in use);
- Hearing protection (if required as described in Subsection 3.2.6);
- Eye protection with permanently mounted side shields; and
- Disposable nitrile or vinyl inner gloves (when the potential for hand contact with contaminants exists).

SECTION 6

Section 6
Contingency Plan

This contingency plan provides the emergency information needed should there be a sudden life- or health-threatening situation where work activities are being conducted. The provisions of the contingency plan are to be implemented immediately in the event of a fire, explosion, or accident which could threaten human health or the environment.

6.1 Emergency Contacts

Emergency contacts and phone numbers for use in emergency situations occurring during field activities are detailed below:

EMERGENCY CONTACT	TELEPHONE NUMBERS
Ambulance	911
Police	911
Fire Department	911
Hospital Emergency Room Saint James Hospital[1]	(708) 756-1000
IEPA - Land Pollution Control Division	(217) 782-6761
IEPA Emergency Removal Unit	(217) 782-3637
Illinois Emergency Service Disaster Agency	(800) 782-7860
National Poison Center	(800) 942-5969
National Response Center	(800) 424-8802
CHEMTREC	(800) 424-9300
U.S. Environmental Protection Agency Emergency Environmental Response (Chicago) Hazardous Waste Hotline	 (312) 353-2318 (800) 621-3191
Site Health and Safety Representative	To Be Established
RMT Project Manager Rae Mindock	(W) (312) 575-0200 (H) (773) 728-3088
Health and Safety Coordinator Shannon Posey	 (W) (864) 281-0300
Facility Manager Peter Bibby	 (W) (708) 756-2010
RMT Corporate Health and Safety Manager Shannon Posey	(W) (864) 234-9431 (H) (864) 213-5989 (Cell) (847) 867-9634 Emergency pager only (888) 576-1899

NOTES:

(1) Hospital map attached in Appendix D:

Saint James Hospital
1423 Chicago Road
Chicago Heights, Illinois 60411

6.2 Emergency Procedures

If an emergency situation develops at the site, the discoverer will notify the HSR who will perform the following:

- Evacuate visitors and nonessential site personnel from the site.
- Notify any other affected personnel at the site.
- Call 911 and give the operator the location and nature of the emergency. The operator will notify the proper emergency services (fire, ambulance, police, etc.) for assistance. Answer all operator questions and let the operator hang up first.
- Determine and initiate (if necessary), in conjunction with emergency personnel, evacuation of residents in the surrounding community.
- Contact the HSC to inform him/her of the incident as soon as possible.
- Contact the RMT PM to inform him/her of the incident as soon as possible.
- Prepare a written summary report of the incident and an Initial Report of Incident form (Appendix E) for the RMT HSC as soon as possible, but no later than 24 hours, after the incident.
- Take appropriate corrective actions at the site prior to authorizing the continuation of work.

If the HSR is not available, the person discovering the emergency situation will initiate the above actions.

6.3 Medical Emergency

If a first aid or medical emergency occurs, the person should be transported to the Saint James Hospital, 1423 Chicago Road, Chicago Heights, Illinois. A map containing the emergency route to the hospital is contained in Appendix D. The map will be posted at a prominent location on site which will be identified prior to beginning field activities. The location will be discussed during the daily health and safety meeting. RMT employees are trained by the American Red Cross in first aid and CPR, and can administer first aid and CPR, if necessary. RMT employees will comply with the RMT Bloodborne Pathogen Program to properly protect themselves from potential contact with bloodborne pathogens, and to properly dispose of any waste generated.

6.4 Emergency Equipment

Emergency equipment that will be available onsite with field personnel will include the following:

- First-aid kits/bloodborne pathogen kits,
- Eyewash (squeeze bottle), and

- Fire extinguishers
- Five gallons of fresh water (for flushing of skin, general washing)

6.5 General On-site First Aid

The following discusses general on-site First Aid procedures for exposure to contaminants on-site:

- ***Contaminated Material in Eyes*** – Wash with copious amounts of water for at least 15 minutes. Lift upper and lower lids occasionally. Seek medical attention immediately.
- ***Contaminated Materials Contact Skin*** – For organic materials, promptly wash area with soap or mild detergent and water. For corrosive materials, flush with water for at least 5 minutes. Do not rub. Check for signs of skin irritation. Seek medical attention if unusual appearance of skin or sensation is noted.
- ***Contaminated Materials Penetrate Protective Clothing*** – Discard protective clothing and underlying clothing. Wash skin as described above. Confer with HSC in selection of new protective clothing.
- ***Inhalation of Contaminated Air*** – Move person to well ventilated area at once. If individual is not noticeably effected, and has no side effects after 15 minutes, returning to work is allowed providing the work area is no longer contaminated. If individual has not fully recovered, continue to monitor for 15 to 20 additional minutes and seek medical attention if necessary. Use artificial respiration if breathing has stopped. In such instances, seek medical attention after victim has resumed breathing. If possible, have someone seek medical attention while person is being resuscitated.
- ***Ingestion of Contaminated Materials*** – Flush mouth with water, being careful not to swallow. Contact local poison center (see telephone number in Emergency Response and Information section). When called for, induce vomiting and give fluids (preferably water) to drink. (DO NOT induce vomiting or give fluids to any unconscious persons.) Seek medical attention promptly.

If at any time, personnel feel fatigued, dizzy, nauseous, or experience headaches, they are to be moved to a well ventilated area and allowed to rest for 15 to 30 minutes. If symptoms do not subside, seek medical attention. Should personnel exhibit symptoms of temperature stress, follow the guidelines for treatment contained in Subsection 3.2.7 of this plan.

6.6 Emergency Route

Appendix D contains a map of the emergency route to the hospital.

Section 7
Record Keeping

This section discusses the records that will be maintained as part of this health and safety plan.

7.1 Training Attendance

A copy of each employee's certificate verifying the completion of the 40-hour Health and Safety Training for Hazardous Waste Sites is maintained in the employee's personnel file. Each employee retains the original certificate issued.

Site-specific health and safety plan review is documented by a sign-in sheet. The sign-in sheet is kept in the project file and is included as Appendix A. RMT's Incident Forms are provided in Appendix E. As stated on the forms, the report should be submitted to the HSC, who will submit the forms to the Superfund HSR and other appropriate individuals.

7.2 Medical Certification

Personnel must receive periodic physical exams to determine their ability to wear a respirator and perform required job functions. The physician conducting the examination must provide a certification of medical fitness for the tasks described and any work restrictions or limitations the employee may have. A copy of this certification and the employee's medical information is maintained in the employee's personnel file.

Section 8
References

IT Corporation. 1998. Draft Feasibility Study Work Plan. Riverdale Chemical Company, Chicago Heights, Illinois.

IT Corporation. 1999. Draft Work Plan for Engineering Evaluation/Cost Analysis. Riverdale Chemical Site. Chicago Heights, Illinois. February 1999.

NIOSH/OSHA/USCG/EPA, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.* October 1985.

Occupational Safety and Health Administration (OSHA) Standards, 29 CFR 1910 and 1926, including 29 CFR 1910.120.

Riverdale Chemical Company. 1997. Remedial Investigation Report, Riverdale Chemical Company. Chicago Heights, Illinois. April 2, 1997.

RMT, Inc. 1999. Feasibility Study Report. Riverdale Chemical Company. Chicago Heights, Illinois. June 1999.

USEPA. 1984. Administrative Order of Consent for Immediate Response Measures. September 28, 1984.

USEPA. 1985. Administrative Order of Consent for Remedial Investigation/Feasibility Study. Riverdale Chemical Company. Chicago Heights, Illinois. February 22, 1985.

USEPA. 1986. Superfund remedial design and remedial action guidance, OSWER 9355.04A.

USEPA. 1992. Standard operating safety guides. Publication 9285.1-03, PB92-963414. Washington, D.C.: Office of Emergency and Remedial Response. June 1992.

USEPA. 1996. ATSDR Record of Activity. Riverdale Chemical. July 29, 1996.

APPENDIX A

Appendix A
Sign-In Sheet

Acknowledgement Statement:

As an employee of RMT, Inc., I have reviewed the Hazard Assessment and Site Health and Safety Plan. I hereby acknowledge that I have received the required level of training and medical surveillance, that I am knowledgeable about the contents of this site-specific Health and Safety Plan, and that I will use personal protective equipment and follow procedures specified in the Health and Safety Plan.

Signatures of RMT Site Personnel (required):

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

_____ Date: _____

Waiver Statement:

In order to enter the exclusion zones and the contamination reduction zones, other site personnel must sign a waiver prior to site entry. Other site personnel must review the RMT HSP prior to entry and should, as a minimum, follow the guidelines specified in the plan. However, visitors are responsible for providing their own health and safety plan and protective equipment and must accept responsibility for their personal health and safety while on-site as indicated on the waiver. Entry authorization to visitors by the HSR does not constitute acceptance on the part of the HSR, RMT, or Riverdale Chemical Company of responsibility for visitor health and safety plan adequacy or visitor safety.

I have reviewed the Hazard Assessment and Site Health and Safety Plan.

Signatures of Site Personnel (required):

_____	Date:	_____
_____	Date:	_____
_____	Date:	_____
_____	Date:	_____
_____	Date:	_____
_____	Date:	_____

APPENDIX B

Appendix B
Lyme Disease

Lyme Disease

Lyme disease is an illness that if not diagnosed and treated promptly can cause serious problems involving the heart, joints, eye, and nervous system. Lyme disease was officially recognized in the United States in 1975 in children from Lyme, Connecticut. Lyme disease is transmitted to people and animals by the bite of the deer (bear) tick (usually in the midwest and eastern coastal states) or the western black-legged tick (usually in the western states), but other tick species are suspected carriers. Adult deer ticks are very small (about the size of a pencil point).

Signs and Symptoms of Lyme Disease

Lyme disease typically progresses through three stages.

Stage 1

In the earliest stage, people with Lyme disease may have any combination of the following signs and symptoms:

- Headache
- Chills
- Nausea
- Fever
- Spreading rash (ECM)
- Aching joints
- Fatigue

Without treatment, these signs and symptoms may disappear altogether, or they may recur intermittently for several months. The red rash, called erythema migrans or erythema chronicum migrans (ECM), usually appears within 3 to 32 days after a person is bitten by an infected tick. The rash is circular in shape and can attain a diameter of 2 to 20 inches. The center of the rash becomes clear, giving the characteristic appearance of a "bulls-eye". More than one lesion can occur on the body. Up to 30% of people who have Lyme disease do not develop ECM lesions, making diagnosis more difficult. If Lyme disease is diagnosed during Stage 1, it is usually easily treated with antibiotics.

Stage 2

Weeks to months after the initial bite, some people may develop complications involving the heart and/or nervous system such as varying degrees of heart blockage, meningitis, encephalitis, and facial paralysis (Bell's palsy). Painful joints, tendons, or muscles may also be noted during this stage of the disease.

Stage 3

Arthritis is the most commonly recognized long-term sign of Lyme disease. Research has shown that even if Lyme disease was not diagnosed and treated promptly, people who eventually received appropriate antibiotic therapy had fewer relapses than those who were never treated.

Removing Ticks

The best way to remove a tick is to grasp it with tweezers as close to the skin as possible and gently, but firmly, pull it straight out. Do not twist or jerk to avoid leaving the head of the tick imbedded in the skin (which may then have to be surgically removed). Wash the bite area and your hands with soap and water and apply an antiseptic to the bite site.

Lyme Disease

Lyme Disease in Domestic Animals

Lyme disease has been diagnosed in over 40 breeds of dogs. Signs in dogs may include various combinations of the following:

- fever of 103-106°F
- severe pain
- sudden onset of lameness
- poor appetite
- intermittent lameness for weeks or months
- signs of illness observed within a few days or up to several months after initial exposure

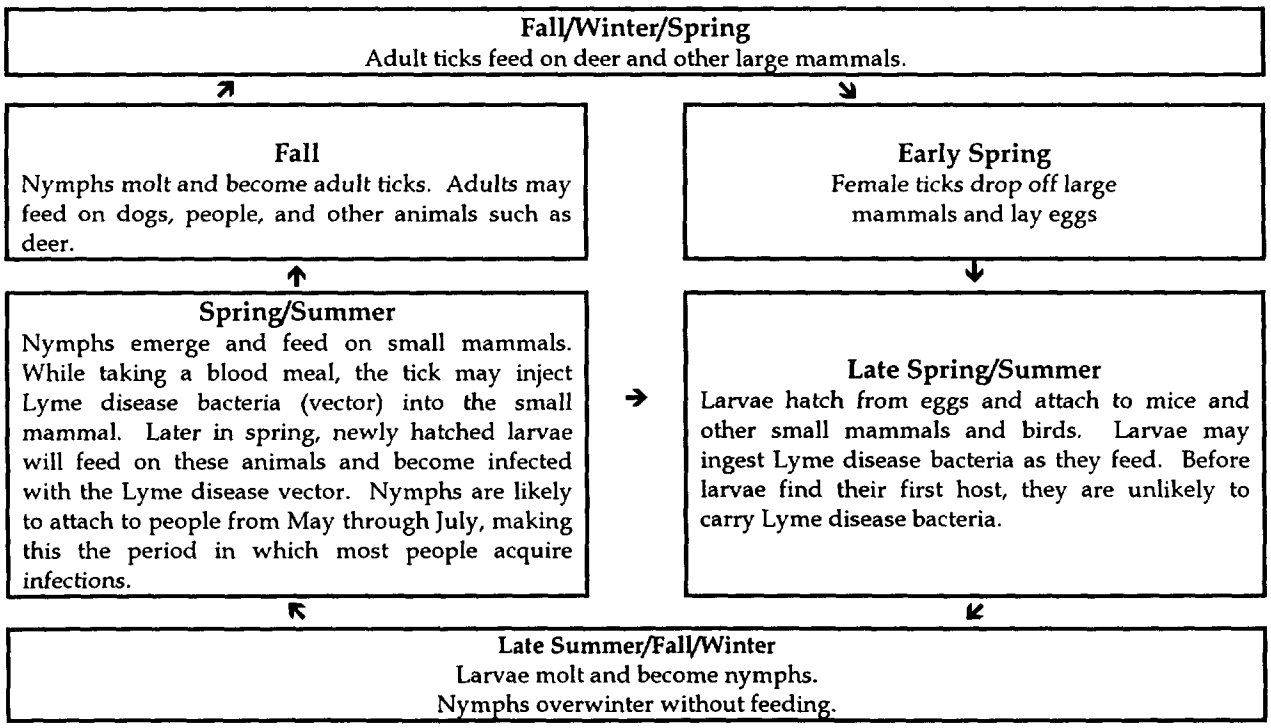
Cattle and horses can also contract Lyme disease. They may exhibit a variety of signs, including fever and lameness.

Prevention

By routinely checking for ticks (adults as well as other life stages) after being outdoors, you can remove them before they embed and have the chance to transmit Lyme disease.

1. Conduct thorough tick checks on yourself, children, and pets after spending time outdoors.
2. Wear light colored clothing. This may not deter ticks, but it makes them easier to find.
3. Ticks wait atop of grasses and other vegetation until something brushes against them.
4. Apply tick/insect repellent to pants, socks, and shoes as well as skin (30% DEET and permethrin are recommended).
5. Always walk in the center of mowed trails to avoid brushing up against vegetation.

Tick Life Cycle



Paraphrased from "Lyme Disease in Wisconsin: An Update" published by Wisconsin DNR and Dept. of Health and Social Services.

APPENDIX C

Appendix C
Poison Plants

Poison Plants

Poison ivy, poison oak, and poison sumac are the three most common urushiol (poisonous, irritant liquid)-containing plants in this country. Each year they cause almost 2 million cases of a dermatitis that can be extremely distressing. Urushiol poisoning is the greatest single cause of Worker's Compensation claims in the United States.

The common poison ivy (Toxicodendron radicans), in six subspecies, thrives from southern Maine to Florida and as far west as Nebraska, Kansas, Oklahoma and Texas. It can also be found near the Mexican border in eastern Arizona and western New Mexico. Humid weather and rich, damp soil favor its spread, but it can persist in what might seem rather daunting circumstances.

Rydberg's poison ivy (Toxicodendron rydbergii) is the most northerly ranging species of poison ivy and can generally be found in moist habitats in the northern and mountain states.

Poison oak is a woody plant that grows in dry barren areas from southern New Jersey to northern Florida and as far west as Oklahoma.

Poison sumac is usually found along the margins of swamps and bogs where the soil is acid and wet. The shrub can grow to 20 or more feet high and is never found in the vine-like form of its ivy relatives. Poison sumac shrubs in dry soil are stunted but are just as poisonous as the larger version. They look harmless and poison the unwary.

The key to protection from urushiol is the ability to recognize and avoid the plants that carry the poison. The folk wisdom "Leaflets three, let it be" is a good rule for the inexperienced, but alert those assigned to work near any vegetation. All the plants mentioned except poison sumac have three-leaflet stems. The two side or lateral leaflets appear to be symmetrical and they grow close to the stem while the end leaflet is distinct and alone. Poison sumac can have 7, 9, 11, or 13 leaflets; these also grow in symmetrical pairs close to the stem, except for the one at the end. The odd numbers between 7 and 13, the symmetrical pairing, and the isolated end leaflet should allow the worker to be able to group poison sumac with its evil relatives and avoid them all.

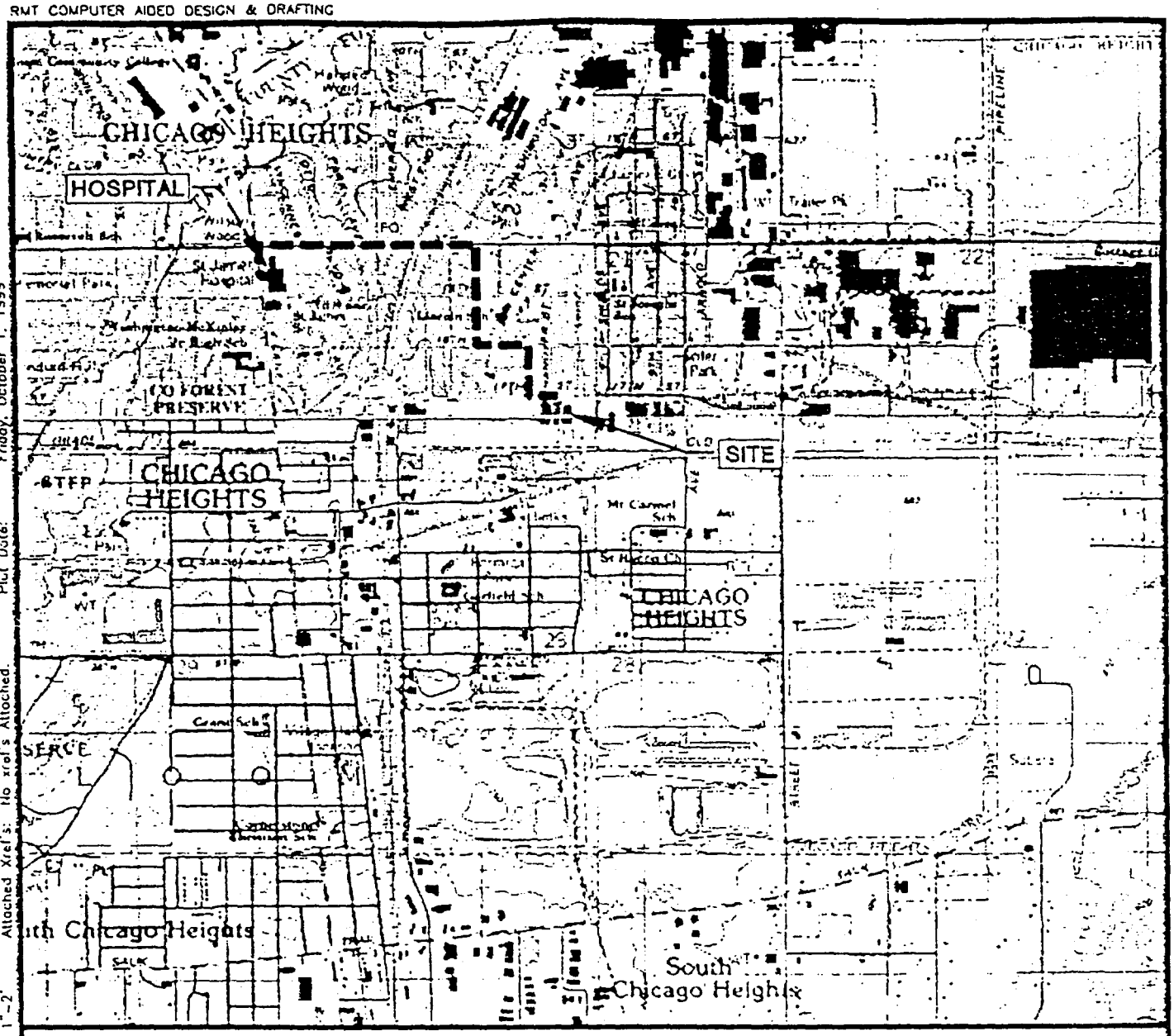
In the rare instance where contact with urushiol-bearing plants cannot be avoided, the worker must take extreme precautions to prevent direct or indirect contamination. Ordinary work trousers tied at the boot mouth, a long sleeved shirt and long gloves will usually protect against direct contamination of the skin, but protection against indirect contamination requires great vigilance. A casual wipe of a contaminated glove against the head can cause the characteristic rash and a breath of smoke from burning urushiol-containing trash can inflame the mouth, nose, throat, and lungs. Clothing and tools can remain contaminated for years after being in contact with a urushiol-producing plant. Washing contaminated clothing and contaminated surfaces with large amounts of cold water is the easiest way to get rid of urushiol.

(Taken from: Mine Safety and Health Administration - Health Hazard Information)

APPENDIX D

Appendix D
Hospital Emergency Route Map

RMT COMPUTER AIDED DESIGN & DRAFTING



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Plot Date:
47936 Bytes
No xref's Attached.
Dwg Size: Attached Xref's:
FASSBENS
1"=2'
Operator Name:
Scale:
J:\04962\01\49620115.dwg
PLOT DATA
Drawing Name:

DIRECTIONS FROM SITE TO HOSPITAL

EXIT SITE ENTRANCE AND TURN WEST (LEFT) ON EAST 17th STREET TOWARDS BUTLER STREET. TURN RIGHT ON BUTLER STREET AND DRIVE ABOUT .1 MILES NORTH TO EAST 16th STREET. PROCEED NORTH TO EAST 14th STREET AND CONTINUE WEST FOR .5 MILES TO CHICAGO ROAD AND TURN LEFT. THE HOSPITAL ADDRESS IS 1423 CHICAGO ROAD.

HOSPITAL ADDRESS

ST. JAMES HOSPITAL
1423 CHICAGO ROAD
CHICAGO HEIGHTS, ILLINOIS, 60411
TELEPHONE: (708)756-1000

(NOT TO SCALE)

HOSPITAL EMERGENCY ROUTE MAP

RIVERDALE CHEMICAL COMPANY
CHICAGO HEIGHTS, ILLINOIS

RMT

DWN. BY:	FASSBENS
APPROVED BY:	
DATE:	OCTOBER 1999
PROJ. #	4962.01
FILE #	49620115.DWG

APPENDIX D

APPENDIX E

Appendix E
Incident Forms

RMT

Health & Safety Plan
Initial Report of Incident

1. Type of Incident

☐ Injury/exposure only ☐ Property loss only ☐ Injury and property loss ☐ Reportable incident without injury or property loss

Project Number:	Project Name:	Date of Incident:	Time: ☐ AM ☐ PM

Incident Location:

Name(s) of witnesses to incident, if any:

If incident caused death or serious injury, this report must be called in to the Health & Safety Director and Human Resources Manager *immediately!!!*

2. Injury/Exposure

For *any* injury, a "First Report of Injury" form must also be completed. This is available from Human Resources.

Injured employee's full name: Did injured see a doctor? ☐ Yes ☐ No

Name and address of treating doctor (and hospital, if one was used):

Describe affected body part and the type, degree of damage or exposure:

3. Incident Description and Analysis

Give detailed description of incident: (attach additional pages if necessary):

Provide an explanation if the incident was associated with the following:

Job factors:

Personal factors:

Unsafe conditions:

Unsafe practices:

Other:

Have similar incidents occurred before? ☐ Yes ☐ No ☐ Don't know

Why?

4. Property Damage/Loss/Theft

Exactly what was damaged, lost, or stolen?

Was this reported to police? ☐ Yes ☐ No If yes, list departments involved:

Describe amount of damage/lost/theft:

5. Action Items

List actions which could be taken to prevent the occurrence of this incident in the future, or to minimize the effects of future incidents.

6. Signature

Name of person completing this form: Office Location: Date:

Signature of person completing this form:

Send this report to the Health & Safety Coordinator who will provide copies to the Corporate Health & Safety Manager, Project Manager, Department Manager, and/or Human Resources Manager, as required.

This report does not replace a Worker's Compensation (First Report of Injury) or Insurance Claim form which may need to be completed for Human Resources or Loss Prevention.

Office Use Only
Reportable: ☐ Yes ☐ No

Health & Safety
Initial Report of Incident

Section 1 This report is required to be completed if an incident involves the following:

- A work-related injury, illness, or exposure affecting an RMT employee or other personnel working or visiting the location (Sections 1, 2, 3, and 5).
- Property theft, loss, or damage through an accident, mechanical failure, weather conditions, etc. (Sections 1, 3, 4, and 5).
- A combination of the above (Sections 1,2, 3, 4, and 5).
- Be sure to list any witnesses and their company affiliation, if known. If there is a death or serious injury, the Health and Safety Director and Human Resources Manager must be notified *immediately.*

Section 2 A "First Report of Injury" form for worker's compensation must *also* be completed for any RMT employee injury. Your Human Resources Representative will provide a form. If the degree of harm is unknown at the time the form is being completed, state "unknown" in the blank.

Section 3 Examples: Job factors may include long work hours, improper equipment, failure of safety devices, etc.

- Unsafe conditions may include weather, poor ventilation or lighting, traffic, slippery ground, etc.
- Unsafe practices may include failure to use safety devices, failure to follow company policies or procedures, etc.
- Personal factors may include lack of sleep, prior illness, improper training, etc.

Section 4 Describe the property which was damaged/lost/stolen. Include police report number, if applicable. An insurance claim form is probably required. The office Administrative Supervisor can supply a form and answer questions.

Section 5 Describe any actions you feel may be effective to prevent the recurrence.

Section 6 Print your name followed by your signature, office location, and the date that you completed the form. The completed form goes to your office's Health and Safety Coordinator who will provide copies to appropriate managers as required.

RMT

Health & Safety Plan
Investigation of Near Miss Incident

ch incident should be investigated. The object is to prevent recurrence and it is only by thorough investigation isit scene of incident and talk to witness) that real causes can be determined and corrected.

ame of Person Involved in Near Miss:	Job Title:	Office Location:

ge:	☐ Female ☐ Male	Length of time with RMT:	Date of Near Miss:	Time:	☐ AM ☐ PM

oject Number:	Project Name:	Near Miss Location:

as employee temporarily working in another epartment or job at time of Near Miss?	☐ Yes ☐ No	How long has employee worked at job where Near Miss occurred?

ow did Near Miss occur? Tell all objects and substances involved in Near Miss. What machine or tool? What erations?

ease indicate which of the following contributed to the Near Miss:

]Failure to secure	☐Improper instructions	☐Lack of training or skill	☐Poor housekeeping
]Horseplay	☐Improper maintenance	☐Operating without authority	☐Poor ventilation
]Improper dress	☐Improper protective equipment	☐Physical or mental defect	☐Unsafe equipment
]Improper guarding	☐Inoperative safety device	☐Unsafe arrangement or process	☐Unsafe position

Analysis and Review

Give us your honest comments on the following questions. We are not trying to blame anyone. Your opinion may help us to prevent repetition.

hat do you consider the real cause of this Near Miss? (Please do not use the word "careless.")

hat steps are being taken to prevent similar incidents or recurrences? (Example: Employees are being instructed in rrect lifting and to get assistance with heavy loads.)

ame of person completing this form: Office Location: Date:

ignature of person completing this form:

end this report to the Health & Safety Coordinator who will provide copies to the Corporate Health & Safety Manager, roject Manager, Department Manager, and/or Human Resources Manager, as required.

Health & Safety
Investigation of Near Miss Incident

This report is required to be completed if the potential for an incident occurs. This involves an incident that could have resulted in an accident, but fortunately/luckily was avoided. The following example will be used throughout this form: A ladder, its base resting on a slick surface, is leaning up against the side of building. A worker climbs the ladder to get onto the roof. As the worker is climbing onto the roof from the ladder, the ladder slips out from under the worker. The worker makes it onto the roof as the ladder falls to the ground. The potential for a damaging accident occurred, but fortunately was avoided. This is a near miss.

The following questions should be answered when completing this form:

- How did the Near Miss occur?
- What do you consider the real cause of this Near Miss?
- What steps are being taken to prevent similar incidents or recurrences?

Analysis and Review

- What do you consider the real cause of the Near Miss?

  Using the near miss example described above, the real cause of the near miss is simply that the base of the ladder was placed on a slick surface that allowed it to slide out as the worker made his/her transition from the top of the ladder onto the roof.

- What steps are being taken to prevent similar incidents or recurrences?

  Continuing with the example given above, the worker should have had an assistant holding the ladder as he/she was climbing to the roof. Also, to keep the base of the ladder from slipping, a rubber mat should have been placed under the ladder.